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17 September 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 162

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INDIA'S OFFER OF NUCLEAR COOPERATION--India has offered to assist Iran in the development of nuclear energy. Commerce Minister Shivraj Patil, currently in Tehran, discussed Indo-Iranian cooperation in the field with the chief of the Atomic Energy Organization of Iran Reza Amrollahi. The talks covered training courses for Iranian technicians at Indian nuclear centers. Tehran also sought Indian expertise to complete her power plant at Bushehr. Patil also met the speaker of the Iranian parliament, Rafsanjani, and discussed with him bilateral matters. Rafsanjani told him that Iran wants India to play a greater role in our foreign economic relations. [Text] [BK270950 Delhi Domestic Service in English 0830 GMT 27 Aug 82]

CSO: 5100/2246

PRC APPROVES NUCLEAR VENTURE WITH HONG KONG

NK200200 Hong Kong SOUTH CHINA MORNING POST in English 20 Aug 82 p 1

[Text] Beijing has approved the construction of a nuclear power plant in Guangdong which will supply electricity to Hong Kong, a vice-governor of the province said yesterday.

Reports reaching Hong Kong said Mr Liang Weilin revealed that the project would go ahead after a meeting between top Guangdong officials and the Hong Kong governor, Sir Edward Youde, who is on a two-day official visit in Guangzhou and Shenzhen.

Speaking to reporters after the meeting, Mr Liang said the governor was told of the decision when he asked if Canton had enough electricity.

Sir Edward was told that the State Council had recently given the green light to build the nuclear plant somewhere between Ta Ya Wan and Mirs Bay -- a peninsula northeast of Hong Kong.

The news has, however, taken both China Light and Power Co and the Hong Kong Government by surprise.

A spokesman for China Light said it had not received any "information or notification" from China on the proposed joint venture between his company and the Guangdong Power Co.

Joint negotiations between the two companies have been underway for many months.

A senior Hong Kong Government official yesterday said the government had no knowledge that approval for the project had been given by Beijing.

"It's very exciting news. I am trying to check this," he said.

CSO: 5100/2244

BRIEFS

MONGOLIA, INDIA COMMUNIQUE--New Delhi, August 15 (XINHUA)--India and Mongolia in a joint communique today expressed their concern over the deterioration of the international situation and the growing nuclear danger. They also stressed the need to undertake genuine measures of disarmament and intensify the search for lasting peace and stability. The communique was issued at the end of Mongolian Foreign Minister Mangal Dugersuren's 3-day visit to India. The two sides reiterated their commitment to the principles of peaceful coexistence and the norms guiding the relations between states laid down in the UN Charter, as the basis for promoting international peace, cooperation and understanding. During the visit, the two countries signed two protocols for long-term cooperation in the fields of agricultural research and health. The two countries have agreed to form a joint consultative committee of experts to implement the protocols. [Text] [OW150746 Beijing XINHUA in English 0730 GMT 15 Aug 82]

CSO: 5100/2244

URANIUM ENRICHMENT PLANT SITES NEAR CITIES INVESTIGATED

Brisbane-Area Inspection

Brisbane THE COURIER-MAIL in English 29 Jul 82 p 1

[Article by Peter Morley]

[Text]

AN Australian mining group has inspected near-Brisbane areas to assess their suitability as sites for a uranium enrichment plant.

The investigations were carried out earlier this month by the Uranium Enrichment Group which looked at the Caboolture and Ipswich areas as part of a three-state search for a site.

The other states are South Australia and Western Australia where areas close to the respective capitals have been considered.

So far the group has taken no decision on a site or what technology would be employed in the enrichment process. The group is understood to include BHP, CSR, Western Mining and Peko-Wallsend.

But as a result of the current research, the group expects to be able to make a final assessment around the middle of next year.

It is understood that during the Queensland investigations which began on July 5, the group had talks with a large State Government inter-department body set up to consider any move for a uranium enrichment plant here.

The Premier, Mr Bjelke-Petersen, has always maintained that the state would welcome uranium enrichment, a step that would be unacceptable to many, particularly if a plant were built on Brisbane's doorstep.

A spokesman for Mr Bjelke-Petersen yesterday confirmed reports by public servants that uranium enrichment projects were discussed by Cabinet on Tuesday but would not comment further.

It could not be confirmed last night but it is believed that Cabinet, after being told that sites close to Brisbane were under examination, continued to express interest in this type of project.

The reluctance of ministers to comment is in line with the cloak of secrecy that was thrown round the inspections by the group, one of at least three consortiums investigating the potential for enrichment plants.

During the inspections to the north and south of Brisbane, the group considered infrastructure requirements and environmental matters and concluded that the Caboolture and Ipswich areas were the types that would be suitable if the project proceeded.

City Council Resistance

Brisbane THE COURIER-MAIL in English 30 Jul 82 p 2

[Text] The Brisbane City Council would do everything possible to mobilise public opinion against the building of a nuclear power station in or near Brisbane, the Vice Mayor, Alderman Ardill, said yesterday.

And the Ipswich Mayor, Alderman Freeman, accused the Queensland Government of sacrificing public safety for the interests of a uranium mining consortium.

An Australian mining operation, the Uranium Enrichment Group, earlier this month visited areas near Ipswich and Caboolture to assess their suitability as sites for a uranium enrichment plant.

It is believed State Cabinet discussed and expressed interest in such projects on Tuesday.

Alderman Ardill said: "We don't want any Three Mile Island disasters around here."

He said the Brisbane City Council did not have a policy on nuclear power stations.

If the State Government announced plans for such a power station in or near Brisbane the council might move to amend the Town Plan to prohibit nuclear power stations.

But the State Government had overriding control over the Town Plan and could quash such an amendment, he said.

Alderman Ardill said his objection to the nuclear industry was largely based on health and safety factors.

Alderman Freeman said he was "completely and unequivocally"opposedd to an uranium enrichment plant being built near Ipswich and would lead protests against such a development.

He said the Ipswich study had been conducted without his knowledge or approval.

Alderman Freeman said it appeared that the State Cabinet had given tacit approval to the project.

The State Opposition Leader, Mr Casey, said that if the Premier wanted a uranium enrichment plant in Queensland, he should built it near his own home at Kingaroy.

A Campaign Against Nuclear Power group organiser, Ms Jenny Pierson said a uranium processing plant near Brisbane could put the city on a foreign country's nuclear "hit-list" in the event of war.

Search in West

Perth THE WEST AUSTRALIAN in English 30 Jul 82 p 11

[Text]

SEVERAL WA sites are being considered for a uranium enrichment plant.

They have been examined by the Uranium Enrichment Group which is carrying out a feasibility study in co-operation with the Federal Government on the establishment enrichment industry.

The office of the Minister for Fuel and Energy, Mr Jones, confirmed yesterday that talks had been arranged between the group and State Government officials.

There was no information on which locations were being investigated.

The group, comprising CSR, BHP, Western Mining Corporation and Peko Wallsend, began a full study early this year.

Approval

The Federal Government gave approval after studying its prefeasibility report.

A full report should be put before the Government during 1984.

The group's brief is to advise on the most suitable enrichment technology, the supplier of the technology and the best plant site.

A spokesman for the group said from Sydney yesterday that sites in three States—WA, Queensland and South Australia—were being studied.

The decision on a site would depend on the type of technology chosen and the attitudes of the State governments.

Two enrichment methods — centrifuge and chemical exchange —were being considered.

The Federal Minister for National Development and Energy, Senator Carrick, has indicated that the Government would like to be in a position to have an Australian enrichment industry operational late this decade.

Power

This would allow Australia to supply an international market for enriched fuel for nuclear power generation which is expected to expand in the 1990s.

According to the chairman of the Australian Atomic Energy Commission, Professor Don George, Australia could be exporting 9000 tonnes of uranium—worth up to $630 million at today's values—by 1990.

If all the ore were enriched in Australia, the added value would be $[illegible] million in a year.

CSO: 5100/7551

LABOR PARTY ISSUES PLAN FOR NUCLEAR-FREE HEMISPHERE

Bowen Statement

Canberra THE AUSTRALIAN in English 27 Jul 82 p 3

[Article by Ted Knez]

[Text]

THE federal ALP yesterday proposed a radical plan in which a Labor government would try to negotiate an international treaty banning all nuclear weapons from the southern hemisphere.

The plan, outlined by the Opposition spokesman on Foreign Affairs, Mr Bowen, would be implemented within four months of the election of a federal Labor government.

Mr Bowen, who was addressing the Australian Institute of International Affairs in Canberra, said the entire Southern Hemisphere should be declared a nuclear-weapons-free zone.

Under a Labor government the treaty would be negotiated by convening a conference of all nations in the southern hemisphere, he said.

Large areas of the southern hemisphere are already nuclear weapons-free by treaty and there are therefore powerful precedents and a substantial base on which to expand, Mr Bowen said.

The continents of Antarctica and South America are already covered by bans on nuclear weapons.

The United Nations and the Organisation of African Unity have called for a nuclear-free African continent and well over 100 nations support the Nuclear Non-Proliferation Treaty aimed at preventing the spread of nuclear weapons.

These existing agreements and aspirations could be built on and brought together into an international treaty formally establishing the whole of the southern hemisphere as a region permanently free of any nuclear weapons.

Mr Bowen said such a zone would apply to States in this hemisphere and States functioning as metropolitan powers.

They would be required to agree not to develop, manufacture, test, acquire or possess nuclear weapons nor to permit any other States to do so in or over territory under their control.

It would also require the agreement of states not to install, store, test or launch nuclear weapons into or from the southern hemisphere.

Such a zone would not preclude transit through the southern hemisphere of nuclear-powered or nuclear-armed vessels, Mr Bowen said.

"This is an ideal to aim for — but is by no means impractical or utopian since the basis for it already exists," he said.

The Labor Party's commitment to effective measures for arms control included support for arms limitation arrangements in the Indian Ocean, such as the Zone of Peace proposal, and support for a nuclear free zone in the Southern Pacific area.

Committed

"These policies are even more significant in view of the failure of the recent UN Special Session on Disarmament," Mr Bowen said.

He said Australia was already "unequivocally committed" to the preservation of the entire Antarctic continent and surrounding oceans as a demilitarised and nuclear-free zone.

This commitment was formally respected by several other southern hemisphere states (including Argentina and South Africa) and by both superpowers in the Antarctic Treaty.

Australia's adherence to and support for the Nuclear Non-Proliferation Treaty had always had bi-partisan political support, he said.

Mr Bowen said there was also bi-partisan opposition in Australia to French nuclear testing in the Pacific.

"I am sure all southern hemisphere states want an end to nuclear tests in this hemisphere and, ultimately, the conclusion of a comprehensive test-ban treaty," he said.

Canberra THE AUSTRALIAN in English 28 Jul 82 p 26

[Article by Marsali MacKinnon]

[Text]

THE Deputy Leader of the Federal Opposition, Mr Lionel Bowen, admitted yesterday there were flaws in an ALP proposal to declare the Southern Hemisphere free of nuclear weapons.

Mr Bowen, who is also the Opposition spokesman on foreign affairs, revealed the scheme on Monday, but agreed yesterday the big powers, including the US and France, might object.

Under the proposal, a federal Labor government would call a conference of nations in the Southern Hemisphere within four months of taking office.

The aim would be to negotiate a wide-ranging treaty binding nations south of the equator to a strong anti-nuclear weapons policy.

Mr Bowen said yesterday there would be "problems and difficulties" in convincing the US, France, South Africa and Argentina to agree to the proposal.

He said he planned to write to the governments of the US, France, Latin American countries including Chile and Argentina, Pacific nations including Fiji, Vanuatu and Papua New Guinea, and black African nations to canvass the idea of a symposium on a nuclear-free Southern Hemisphere.

"I will do this within the next few weeks. The Labor Party would try to organise this symposium within four months of gaining office," he said.

Details

Copies of Mr Bowen's speech outlining the proposal have been sent to US, French and British government representatives in Canberra.

"I have had no response from any foreign government on this yet; it's still very new," he said.

The US Embassy is understood to have sent an outline of the scheme to Washington for further study.

Mr Bowen admitted there were "weaknesses" in the nuclear-free policy which would allow nuclear-powered and nuclear-armed vessels to travel in southern waters.

He said the proposed treaty "may look like a weak approach from us in Opposition, but somebody's got to take a stand on this. The Government will not do anything."

Mr Bowen said the proposal had resulted from the failure of the recent second UN special session on disarmament.

"The United Nations is seen by many countries as a discredited forum. It is time for nations to take initiatives of their own."

Mr Bowen said he was "extremely hopeful" of support for the proposal from Pacific countries such as Fiji, members of the Organisation of African Unity, and from the 22 Latin American countries which ratified the Tlatelolco non-proliferation treaty banning nuclear weapons in South America.

But he said there were "problem areas" included the US naval base at Diego Garcia, where it was suspected the US planned to instal nuclear weapons, and at the French testing station in Mururoa Atoll in the Pacific.

South Africa was also suspected of having, or trying to develop, nuclear weapons and Argentina was building a nuclear reactor with German technical assistance which could be used to manufacture weapons-grade nuclear fuel.

But Mr Bowen said there were precedents for banning nuclear bases and the storage, manufacture and firing of nuclear weapons.

"The United States and the USSR have agreed to a nuclear-free zone in the Middle East. The US, South Africa and Argentina are among the signatories to the Antarctic treaty to keep the Antarctic nuclear-free," he said.

"We hope these nations can be persuaded to extend this commitment."

Mr Bowen said the proposal for a nuclear-free southern hemisphere would be meaningless in the event of a nuclear war.

The Foreign Minister, Mr Street, earlier yesterday attacked the proposal as "lacking any sense of reality" because it separated the Northern and Southern Hemispheres. Such a distinction would be naive and dangerous.

'Negative'

Mr Bowen replied to this criticism by saying the Government had already supported plans for a ban on nuclear weapons in the South Pacific, Antarctica and the Indian Ocean, and until now the Australian Government and the Opposition had agreed on support for nuclear-free zones in the Pacific, Antarctica and the Middle East.

"Mr Street's rejection of the Labor proposal is negative, contradictory and disappointing," he said.

CSO: 5100/7550

JABILUKA URANIUM MINE GETS FEDERAL OK; FUTURE UNCLEAR

Anthony Remarks

Melbourne THE AGE in English 27 Jul 82 p 3

[Article by David Uren and Stephen Mills]

[Text]

Pancontinental Mining has no plans for starting construction of the big Jabiluka uranium mine in the Northern Territory, despite receiving overnment approval for the project yesterday.

A company spokesman said the project could not go ahead until enough export contracts had been secured.

Pancontinental officials have been talking to possible users for 10 years and have been actively seeking contracts since conditional approval was given by the Government on 17 March this year.

The Government's approval signified that the project had overcome all environmental and social objections to its development but it still needed the sales, one spokesman said.

The Trade and Resources Minister, Mr Anthony, said yesterday the Jabiluka joint venturers planned to begin construction during the dry season next year, depending on market and financing arrangements. On that basis production could be expected to start at Jabiluka towards the end of 1986, he said, in announcing that the Northern Territory Government could award mining leases for the project.

Mr Anthony's confidence about the uranium industry's prospects extended to the nearby deposit at Koongarra. Development spending of "hundreds of millions of dollars" could be expected on Koongarra and Jabiluka by 1986, he said. Mr Anthony said he was certain the long-term future of the industry was assured, but he admitted that it was "going through a slack period" at present.

Pancontinental will not reveal what it would regard as a minimum tonnage for the project to go ahead, but industry sources say contracts covering at least 3000 tonnes a year for 10 years would be required. This is about 7 per cent of the world's total uranium consumption and with the market now heavily oversupplied, such contracts will be difficult to find.

Stockpiles

Mines around the world are turning out about 50,000 tonnes of uranium a year, while consumption by nuclear power stations is only about 25,000 tonnes a year. The rest is adding to the already burgeoning stockpiles maintained by the power utilities.

The other problem which Pancontinental has yet to resolve is the level of foreign ownership. At present, Getty Oil of America holds a 35 per cent interest in the Jabiluka project.

The Foreign Investment Review Board guidelines say that foreigners can own no more than 25 per cent of a uranium mine. The Pancontinental spokesman said this was a matter for Getty Oil to resolve with the FIRB. It did not have to be settled until the mine had been built and exports were ready to begin, he said.

Mr Anthony attacked the Labor Party for "ignoring the reality" of the uranium industry. Its new policy committed it to destroying the industry slowly, with the maximum confusion, he said.

"It is clear now, after the smoke has cleared that it was uranium which tripped off the explosion on the leadership that has shattered the Labor Party.

"Those who wanted to punish Mr Hayden for his stand on uranium first promised support to Mr Hawke, then swung back to Mr Hayden.

"Without their support, Mr Hayden would not be Labor leader now. No one could seriously believe he will not repay that debt if Labor ever comes to power," Mr Anthony said.

French Overtures

Canberra THE AUSTRALIAN in English 23 Jul 82 p 13

[Article by Anton Whitehead]

[Text]

THE French nuclear industry is interested in taking equity in the rich Jabiluka uranium project, representatives of the Northern Territory Mines and Energy Department said yesterday.

Chief Minister, Mr Everingham, the Minister for Mines and Energy, Mr Tuxworth, and secretary of the Department of Mines and Energy, Mr Purcell said the French wanted a stake in the project.

"The French have told us they want a piece of Jabiluka because of the nature of the ore body, its size and location in Australia," Mr Purcell said.

He said the French wanted a 100 per cent nuclear base load – electric power – within a decade and Jabiluka was a part of their long-term plans.

But any attempt by the French to buy into Jabiluka would run into Foreign Investment Review Board problems.

The FIRB requires uranium projects to be 75 per cent Australian owned and the foreign-owned Getty Oil Development Co Ltd already has a 35 per cent interest and is required to cut its stake.

Mr Everingham and Mr Tuxworth are hopeful construction at Jabiluka will begin by the next dry season, but contracts have not yet been signed and buyers are sitting on the sidelines waiting for an economic recovery and for uranium prices to bottom.

The spot price for uranium is $19 a lb, compared with the floor price set by the Federal Government of more than $30.

Mr Tuxworth said the government floor price should not be a worry as uranium was "worth only what you can get for it and not what the Government decides it is worth."

Territorial Government Plans

Melbourne THE AGE in English 26 Jul 82 p 3

[Article by Stephen Mills]

[Text]

CANBERRA — The Northern Territoy Government is set to give the go-ahead for the huge Jabiluka uranium mine, on the edge of the Kakadu National Park.

The NT Minister for Mines and Energy, Mr Tuxworth, will announce tomorrow that Pancontinental Mining Ltd will be granted mining leases for Jabiluka, the richest uranium mine in Australia.

The announcement coincides with a new round of exploration in the uranium-rich Kakadu region, east of Darwin. A consortium of companies is believed to be preparing for an aerial survey of potential deposits in land where Aboriginal ownership is still disputed, while Queensland Mines is about to renew exploration on its mined-out Nabarlek lease.

Despite the activity, however, the future of all new uranium projects remains clouded because of an oversupply of yellow-cake and a three-year slide in its price on world markets.

The downturn has prevented Pancontinental from signing contracts for Jabiluka ore, and despite winning mining approval it may not go ahead immediately with construction of the $400 million mine.

NT Government Ministers are confident that contracts can be signed, and that work will start this year. They are optimistic that French nuclear energy users will buy Jabiluka ore on long-term contracts, possibly in exchange for an equity interest in the project.

However industry sources are less confident about Jabiluka's future. They point to the existence of the nearby Ranger mine, which is already in full production and has vast reserves available to be mined.

If Pancontinental does proceed with the mine, it will come under the ALP's new, softened, uranium policy. Like Ranger it would be liable to be "phased out" in the event of the election of a Labor Government, but its contracts would not be repudiated.

Mining approval for the Jabiluka project follows lengthy consultation with Aboriginal communities.

The Northern Land Council, and traditional owners have agreed to a deal which will give them royalties of about $11 million.

The Jabiluka mine has estimated reserves of more than 200,000 tonnes. The Ranger Mine, operated by Energy Resources of Australia, has reserves of 125,000 tonnes. A third mine in the region, Nabarlek, has already been mined out and 12,000 tonnes of ore are stockpiled awaiting sale.

Unlike Ranger, Jabiluka will be an underground mine — entailing greater cost but less damaging to the sensitive environment.

Labor Party Warning

Canberra THE AUSTRALIAN in English 28 Jul 82 p 1

[Article by Russell Schneider]

[Text]

THE Labor Party yesterday warned miners, investors and buyers that they faced an "extremely risky" decision in opening up new uranium mines in Australia.

The Labor spokesman on the environment, Mr Stewart West, said that the proposed Jabiluka mine would not be approved under present ALP policy.

The Federal Government on Monday announced it was prepared to grant a 42-year mineral lease to Pancontinental Mining and Getty Oil on the Jabiluka project.

But Mr West warned that a Labor government would almost certainly veto the project.

He said the ALP's recent national conference decisions meant that the only uranium mines able to continue operating under a Labor government policy would be Ranger and Nabarlek.

"I think it is unwise for Pancontinental to go touting overseas for contracts in this situation," he said.

"I think Pancontinental is acting in an irresponsible manner.

"If Labor wins the next election, under the current policy, there will not even be a question of compensating the workforce.

"To continue this project must be putting shareholders' money at risk.

"The ALP policy seems to rule out all mines with the exception of Ranger and Nabarlek if Labor comes to power.

"It would certainly rule out Jabiluka.

"If they are not on stream by June 1982 we are certainly not committed to allow them to continue.

"This particular mine cannot be on stream before 1983.

"Therefore it is an extremely risky enterprise to say the least."

NT Report on Prospects

Sydney THE SYDNEY MORNING HERALD in English 2 Aug 82 p 15

[Article by Brian Johnstone]

[Text]

DARWIN. — A confidential report compiled by a high ranking Northern Territory public servant casts doubt on the availability of long-term sales contracts for the proposed $650 million Jabiluka mine.

The eight page status report says prospects for large sales of uranium from Jabiluka on the over-supplied world market appear gloomy unless the Commonwealth Government dramatically lowers or abandons its minimum pricing policy on uranium exports.

The report, made available to AAP, also says estimates on output and prices of uranium oxide given by Pancontinental mining are very optimistic and could easily be a third lower than estimated.

The report was written by the Secretary of the NT Department of Mines and Energy, Mr Mike Purcell.

The minister for Trade and Resources, Mr Anthony, announced last Tuesday that the Federal Government had given approval for the NT Government to issue a special mining lease for the Jabiluka project.

Mr Purcell's report says production from Jabiluka will be 3,000 to 4,500 tonnes of yellowcake a year compared with current world consumption of about 33,000 tonnes a year and production of 55,300 tonnes a year.

Mr Purcell says the over-supply is due to over-projection of uranium demand in 1980. Prospects of uranium sales are also extremely limited.

"The dramatic downturn of new reactors coming on stream has culminiated in a substantial short and long run over-supply, compounded by inventory unloading," the report says.

"The long run excess of supply has been accumulating for a decade and has been disguised by the growth of uranium stockpiles.

"The Commonwealth is still maintaining its present pricing policy — a minimum export price of $30 dollars per lb of uranium oxide plus a formula cognisant of escalating production costs.

"The spot market in June this year indicated a price of $US22.70.

"Prospects for large sales of uranium from Jabiluka appear gloomy unless the Commonwealth dramatically lowers its minimum export price or abandons the minimum prising policy altogether.

The report says the nuclear electricity programs of many countries have slowed down, particularly in the US and Britain.

It says countries which still have nuclear electricity programs strong enough to be considered potential Jabiluka customers are France, South Korea, Sweden, and Taiwan.

Mr Purcell says France probably represents the best opportunity for sales from Australia.

"However the problem for Jabiluka is that the French are most interested in negotiating "cost-plus" contracts and this would be facilitated by equity participation," Mr Purcell says.

"In this respect the West Australian Yeelirie project may be advantaged over Jabiluka as there is now a 15 per cent equity position available after the withdrawal of Esso Australia from the project."

Both the NT Mines and Energy Minister, Mr Tuxworth, and the Chief Minister, Mr Everingham, stated last week that the French were looking for equity participation in Jabiluka.

But, as Mr Purcell points out in his report, the joint venturers, Pancontinental Mining and the American-owned Getty Oil Development Company, are already facing an equity problem.

Pancontinental has a 65 per cent share in Jabiluka and Getty 35 per cent, but existing Commonwealth policy requires 75 per cent Australian ownership which will require Getty to divest 10 per cent of the total equity.

On the question of the other identified markets, Mr Purcell says South Korea's nuclear program is strong but they are unhappy with the Australian pricing policy and recently rejected a contract with Queensland Mines Ltd, which operates the Nabarlek mine about 50 kilometres north-east of the Jabiluka project area.

Mr Purcell reports that Taiwan's program is very strong but uranium sales from Australia to that country "would be politically sensitive because mainland (Communist) China is recognised as the legitimate seat of Government for the Chinese."

If it gets export contracts, Jabiluka would be the biggest uranium mine in Australia and one of the biggest in the world with deposits in two ore bodies totalling 53.3 million tonnes, yielding 207,000 tonnes of uranium oxide at an average grade of 0.39 per cent.

The uranium deposits are almost double the combined known reserves of Ranger, Nabarlek and the proposed Koongara mine in the territory uranium province, about 250 kilometres east of Darwin.

In addition to uranium, Jabiluka has gold deposits totalling 1.1 million tonnes of ore averaging 10.7 grams a tonne.

Jabiluka, which would be the first underground uranim mine in the Territory, would have a life of about 45 years.

According to Mr Purcell's report, the capital cost of a project with a capacity of 4,500 tonnes of uranium is in the vicinity of $650 million.

He says Pancontinental anticipates a 3½ year construction phase starting in May next year.

Production is planned to begin in 1986.

Off-shore financing is likely for the project and until production begins. "It is assumed that interest would be capitalised resulting in a total loan requirement of $1,200 million."

The report says the joint venturers do not anticipate paying income tax until about six years after production begins because of accumulated exploration expenditures, the 20 per cent investment allowance and rapid write-offs available for capital investment in mining.

On the question of royalties, Mr Purcell points out that uranium is owned by the Commonwealth and uranium royalties will accrue to the Commonwealth Government at a rate of 5.5 per cent until 1990.

Under the financial memorandum of understanding between the Commonwealth and the NT GOVERNMENTS, THE Commonwealth is to pay to the NT an amount in lieu of royalty of 1.25 per cent of the value of yellowcake at the mine.

When ownership of uranium is transferred to the Territory — a question yet to be decided between the two governments — the royalty rate of 5¼ per cent will be maintained until 1990 but the territory's new Mineral Royalty Bill, which sets a royalty rate of 18 per cent on pre-tax profits, will come into force.

Gold is owned by the Territory and the provisions of its new Royalty bill will apply immediately on gold production.

The report sets out estimates of royalty revenue to the Territory between 1986 and 2010 under Commonwealth and Territory ownership.

It estimates that during that period, total undiscounted payments to the Territory under Commonwealth ownership would be $175 million, with total discounted payments estimated at $50 million.

Under Territory ownership, total undiscounted payments are estimated at $950 million with a discounted figure of $155 million.

It is estimated that total undiscounted payments to Aborigines by the company and the Commonwealth in that period would be $640 million, with total discounted payments of $125 million.

The report reveals the pre-production payments to Aborigines in the final agreement between the Northern Land Council and companies amount to $8.8 million.

No details of that agreement, which was signed just under a fortnight ago, have yet been released publicly but recent reports have put the figure at between $10 and $14 million.

The Aborigines will also receive an annual payment of 2 per cent of the value of the yellowcake at the mine.

Thereafter, the annual payments are to be at a rate of 2½ per cent with payments from the Commonwealth of an additional 2½ per cent.

Company Response

Perth THE WEST AUSTRALIAN in English 2 Aug 82 p 18

[Text] **SYDNEY: Pancontinental Mining had its own long-term arrangements in the uranium market-place that were not dependent on government reports or general documents, the company's chairman, Mr Anthony Grey, said last night.**

He said: "We haven't signed any contracts but we're confident that we'll meet our expectations of 3000 tonnes, building to 4500 tonnes over two years.

"I can't be more specific than that. We know our business. We've been in it for some time."

Pancontinental and Getty Oil Development Company are joint venturers in the proposed $650 million Jabiluka uranium mine in the Northern Territory.

A confidential report compiled by a high-ranking NT public servant, Mr Mike Purcell, said that prospects for large uranium sale from Jabiluka on the oversupplied world market appeared gloomy unless the Federal Government lowered or abandoned its minimum-pricing policy on uranium.

The report said that estimates of uranium oxide output and prices given by Pancontinental were very optimistic and could easily be a third lower than estimated.

Mr Grey said: "What we're offering in the market-places of Japan, Korea, Germany, France, Sweden andthe United States is long-term strategic access to security of supply.

"When sources are short our customers will know they can still be confident of supply for their utilities.

'Nothing new'

"There's nothing new about current estimates of over supply —but what we're saying is 'Give us your orders now and we'll still be able to fulfil them when supplies are short'."

Mr Purcell's report said that Jabiluka would produce 3000 to 4500 tonnes of yellowcake a year compared with current world consumption of about 33,000 tonnes and production of 55,300 tonnes per year.

In CANBERRA, a spokesman for the Trade and Resources Minister, Mr Anthony, said that the Government was committed to the full development of a uranium industry.

The Government was actively working to ensure that.

The floor price policy was to a large degree supported by the industry and change in that policy was not being considered.

CSO: 5100/7549

ROXBY DOWNS ORE DEPOSIT DESCRIBED; IMPACT REPORT DUE

Uranium Statistics

Melbourne THE AGE in English 27 Jul 82 p 33

[Article by David Uren]

[Excerpts]

Roxby Downs is one of the biggest mineral deposits in the world, according to preliminary data from Western Mining Corporation.

Analysis of just part of the deposit has shown about 2000 million tonnes of ore containing 32 million tonnes of copper, 1.2 millionnes of uranium and 1200 tonnes of gold.

WMC's executive director, Mr Hugh Morgan, said last night: "Its richness lies not so much in its grades, as in its extraordinary size which will require large scale operations."

Part of the high grade ore reserve is near the Whenan exploration shaft which is being sunk into the orebody. Detailed drilling is in progress in this area in an effort to establish a proven ore reserve.

The uranium content of 0.6 kilogrammes a tonne is only about a fifth of that at Ranger uranium mine, but is a significant component in the value of the ore.

At current prices, one tonne of the ore would contain copper worth $24, uranium worth $26 and gold worth $7.50. This suggests a value of ore of $US57.50 for a tonne of ore.

The Roxby indenture agreement with the South Australian Government calls for the feasibility study to be completed by the end of 1984. Company officials suggest the study could be completed sooner.

Environmental Report

Canberra THE AUSTRALIAN in English 28 Jul 82 p 11

[Article by Bruce Jacques]

[Text]

NOW that Western Mining Corp has got the Roxby Downs indenture bill through the South Australian Parliament and confirmed the deposit as one of the world's largest copper orebodies, the next battleground on the way to development is likely to be environmental.

The environmental impact statement (EIS), part of the $100 million feasibility study being undertaken by WMC and its joint venture partner at Roxby, the BP group – is expected next month.

The EIS should make development intentions for the huge resource project much clearer, although it will also give opponents of the project another chance to try to impede its progress.

Environmental opposition is likely to centre around the uranium issue.

At the moment, only the basic outline of how the deposit will be developed is available and most of that relates to the companies' agreement with the South Australian Government.

Subject to the outcome of the feasibility study, this commits the companies to spend about $1000 million to develop a mine ultimately to produce about 150,000 tonnes of contained copper with mine start-up in 1987.

That has now probably been pushed back to 1989 by the sheer scale of the operation, but the EIS may well fill in a lot of other gaps.

WMC and BP, for instance, are still working on their optimum production mix from Roxby which is also rich in gold and uranium.

This will not only depend on the cheapest and best mining methods but also on markets.

To an extent, the companies have already narrowed their development options by sinking a $50 million 4km exploration-cum-development shaft (known as the Whenan shaft) in the central high grade area of the orebody.

Nucleus

Western Mining indicated on Monday that the 28 sq km orebody outlined so far at Roxby contains an estimated 2000 tonnes of ore averaging 1.6 per cent copper, 0.64 kg a tonne of uranium oxide and 38.5 million oz of gold at extremely variable grades.

The Whenan shaft is being sunk in an area where the copper grades average a much higher 2.45 per cent copper and 0.93 per cent uranium but gold grades are again variable.

The shaft will take about two years to sink and one year's work has already been done.

There is little doubt that this shaft will form the nucleus of any mine development and while it is still being officially referred to as an exploration shaft, the partners make no secret of the fact that it will be big enough for production.

Having started development in this high grade area, the partners would then have a number of options, all of which would depend on comparative costs.

For instance, it could be cheaper to develop one or more other high grade areas simultaneously with the Whenan shaft, effectively making Roxby a dual or triple mine.

But at this stage it is most likely the partners will sink a number of shafts in the Whenan area to reach full production targets.

The partners are also working on how they should process the ore once it is won.

A lot of time is being spent deciding exactly which technology should be used for the processing, an area in which WMC's experience in nickel – it runs a smelter at Kalgoorlie and a refinery at Kwinana – will prove valuable.

CSO: 5100/7550

EDITORIAL RAPS VICTORIA'S CAIN FOR NUCLEAR-SHIP BAN STAND

Melbourne THE AGE in English 29 Jul 82 p 13

[Text]

WHEN the Cain Government's attempt to ban nuclear-powered and nuclear-armed ships from Victorian ports became known last month, we described it as the new Labor administration's first major folly. As the Premier should have known, the State has no constitutional authority to enforce this aspect of Labor's idealistic urge to declare Victoria a nuclear-free zone. All that the quixotic gesture achieved was to enable the Prime Minister, Mr Fraser, to exploit to his political advantage the Labor Party's divisions over nuclear energy and ambivalence towards the American alliance.

Now Mr Cain has compounded his foolishness by summoning the American Consul-General, Mr Donald Cleveland, to protest against the visit to Melbourne next week of the USS Goldsborough, which may or may not be nuclear-armed. The Premier is entitled to his well-founded opinion that Mr Fraser's eagerness to invite the US Navy to accept the hospitality of Australian ports is not innocent of political motivation. But Mr Cain cannot convincingly complain about political provocation and foreign interference in domestic affairs when his own Government started it all by trespassing on Commonwealth responsibility for foreign affairs and defence and by exposing the Labor Party to charges that its anti-nuclear feelings are contrary to Australia's strategic interests.

Still less has the Premier any business to be warning the US Consul-General that the Prime Minister was trying to "strain relationships between this Government and the United States". There is no diplomatic relationship between the State of Victoria and the United States. The relationship — and friendly alliance — is between the United States and the Commonwealth of Australia. American diplomats in Australia are well aware of the Federal and party conflicts within this country without being lectured by a State Premier, but they cannot be expected to defer to a provincial Government acting beyond its authority. Mr Cain should accept once and for all that the question of visits of American warships is outside his jurisdiction, and recognise that his quarrel is with Canberra and not with Washington.

CSO: 5100/7550

BRIEFS

NUCLEAR SHIP PROTEST--Brisbane's waterfront was idle yesterday when waterside workers went on strike in protest at the visit of the American nuclear vessel USS Goldsborough. The 24-hour stike by 600 wharfies left nine ships stranded in the port and cost about $1 million in lost production. The secretary of the Queensland Trades and Labor Council, Mr Fred Whitby, said the strike had been called because of the council's policy of opposition to nuclear vessels. He said the USS Goldsborough was not nuclear powered, but had the capacity to carry nuclear missiles. Mr Whitby said only unions which would be in direct contact with the ship had been asked to strike. Other unionists had been urged to take part in a picket against nuclear war outside the PanAm offices in Brisbane yesterday. The USS Goldsborough will leave Brisbane on Monday for Hobart. It will visit Melbourne, Hobart and Sydney during the next two weeks. [Text] [Canberra THE AUSTRALIAN in English 23 Jul 82 p 2]

CSO: 5100/7551

BENEFITS OF INDO-FRENCH PACT ON NUCLEAR FUEL TOLD

Madras THE HINDU in English 9 Aug 82 p 1

[Article by G.K. Reddy]

[Text] New Delhi, Aug 8--An understanding has been reached between India and France that the safeguards to be applied to the French-supplied enriched uranium and its by-products would be the same as those provided for in the 1963 Indo-U.S. agreement.

The understanding reaffirms that the plutonium derived from the reprocessing of the spent fuel at Tarapur would not be used for any explosive purposes in the light of the letters exchanged in 1974 after the Pokhran test.

It was officially confirmed by the visiting French Foreign Minister, Mr Claude Cheysson during his two-hour talk today with the External Affairs Minister, Mr P.V. Narasimha Rao, that France would not insist on any additional safeguards other than what were already being applied to the U.S.-supplied materials under existing agreements.

Cheysson Meets P.M.

This was restated quite explicitly when Mr Cheysson called on the Prime Minister later this evening after her return from Bombay. His one-day visit to Delhi concluded on the reassuring note that the new nuclear fuel supply agreement would be treated as a bilateral agreement between India and France with the concurrence of the United States, thereby implying that the supply would not be interrupted in the event of a new controversy with the U.S. over India's reprocessing rights.

The Indian side was satisfied that the two issues would be effectively delinked under the new arrangement. It was for this reason that India suggested and France readily agreed, that the new fuel supply arrangement should be made through an exchange of bilateral documents between the two countries instead of complicating the matter through a quadrilateral accord between India, United States, France and the International Atomic Energy Agency (IAEA) which could lead to some difficulties in future over the reprocessing question.

The documents to be exchanged between India and France would include as annexures the texts of the 1963 Indo-U.S. agreement, the trilateral understanding reached in 1971 for transferring the inspection responsibilities for the enforcement of the safeguards to the IAEA and the letters exchanged after the 1974 Pokhran test reaffirming that the fissile materials derived from the U.S. supplied fuel for Tarapur would not be used for any explosive purposes.

Addressing a press conference this afternoon, Mr Cheysson indicated the broad features of this understanding saying that India and France had already an agreement on nuclear cooperation. A joint request by India and the U.S. was made towards the end of July through separate but more or less identical communications for the supply of uranium fuel enriched to 2.7 percent to help run the Tarapur plant during the remainder of the 1963 agreement under which the U.S. had assumed the exclusive responsibility to provide fuel for 30 years till 1993.

The French Foreign Minister said his Government had readily agreed to the request in principle. As one of the pioneers in what he called electro-nuclear development, France had the surplus capacity to meet India's requirements. It agreed to supply the fuel within the framework of the existing safeguards at Tarapur which were being enforced through IAEA without insisting on any additional conditions.

Mr Cheysson pointed out that the French readiness to assume this responsibility within the limits of the pre-nuclear non-proliferation treaty (NPT) safeguards already accepted by India had to be viewed in the wider context of the growing political and economic relations between India and France.

He implied that if France had made this departure from its policy of insisting on the stricter safeguards evolved by IAEA after the nuclear non-proliferation treaty came into force, it had been done as a very special case to promote a wide-ranging friendship and cooperation.

Another important feature of the understanding with France is that there would be no obligation on India's part to continue to obtain enriched uranium only from France after the transfer of the fuel supply responsibility by the U.S. to it.

Mr Cheysson, at his press conference, spoke eloquently on the growing Indo-French relations which extended now to various spheres including supply of defence equipment and now even nuclear cooperation and he told him that everything was all right now.

CSO: 5100/7142

CHANGE IN FRENCH STAND ON NUCLEAR FUEL SCORED

BK311428 Bombay THE TIMES OF INDIA in English 25 Aug 82 p 8

[Editorial: "French Volte Face"]

[Text] Regrettably, the amicable settlement of the vexed issues of fuel for the Tarapur plant with the Reagan administration is in danger of coming unstuck. The main responsibility for this unfortunate development lies on France, which had agreed to take over from the U.S. the obligation to supply enriched uranium until 1993 when the Indo-U.S. agreement on Tarapur expires. While doing so, France had clearly stated that it would accept the responsibility on the basis of the existing safeguards agreed upon by India, the U.S. and the International Atomic Energy Agency (IAEA) trilaterally. This assurance was reaffirmed most unambiguously by the French foreign minister, Mr Claude Cheysson, on a visit to New Delhi only the other day. And yet France has suddenly and sharply changed its position.

In a note to the External Affairs Ministry, it has demanded that India should negotiate a fresh agreement with IAEA. Since the IAEA, in cooperation with the London club of nuclear suppliers, has worked out a standard safeguards system to cover all transactions in nuclear equipment and materials, the implication clearly is that the supply of French fuel can begin only if this country accepts safeguards which are far more restrictive and stringent than those applying to Tarapur at present. For one thing, there will be a put-all clause which means that any nuclear facility where any by-product of Tarapur is used, however remotely, will automatically come under the IAEA safeguards. For another, the new safeguards will remain in force in perpetuity while the existing ones are due to lapse with the expiry of the Indo-U.S. agreement in 1993.

For well over four years, India has resisted U.S. pressure to accept the so-called full-scope safeguards as the price for continued supplies of enriched uranium. The main merit of the Indo-U.S.-French deal was that it offered a way out of the impasse without forcing either this country or the United States to abandon its basic position on safeguards. All this has now been endangered by the French volte face. The reasons for it remain obscure. But it seems a safe bet that the French have acted under pressure from the IAEA or the London club or the United States or all the three.

In any case, whatever the French motivation, Paris must know that New Delhi will not accept from it the kind of demands that successive Indian governments have rejected from the U.S. Appropriately New Delhi has put Washington on notice that the primary responsibility for implementing the understanding on Tarapur rests with the latter.

If this approach proves ineffective, this country will have every right to terminate the Indo-U.S. agreement and run Tarapur on the basis of the indigenously developed mox fuel cycle.

CSO: 5100/2246

TENDERS FOR CHASHMA NUCLEAR PROJECT SOON

Islamabad THE MUSLIM in English 21 Aug 82 p 8

[Text] ISLAMABAD, Aug. 20: Tenders for the Chashma Nuclear Power Project will be floated "very soon", Chairman, Pakistan Atomic Energy Commission, said here today.

Talking to newsmen, he said the construction of 900 mw atomic energy reactor will start next year and will be commissioned during 1989-90. The project will cost 1.7 billion dollars involving foreign exchange component of 65 per cent, he said.

Mr. Munir Ahmed Khan referred to a high level meeting held here last week under the chairmanship of Finance Minister Ghulam Ishaq Khan which finalised the details of the project.

Replying to a question about the participation of foreign firms in the tender, he said the tender will be open for all to participate. He said the Commission is in close contacts with the local industries both in private and public sectors for the provision of components and services etc according to our requirements.

However, he said "we will go for optimum utilisation of indigenous capabilities".

Mr. Munir Ahmed Khan said the plant when commissioned will increase the electricity by about 15 per cent of the present installed capacity. This will also save 1.2 million tons of imported oil per year.

He said the plant which was planned earlier would have been commissioned by 1982-83 but the delay was caused by financial constraints. He said the Government will prepare plans for another such project after the start of work on this project.

Mr. Munir Ahmed Khan said the KANNUP after a short difficult period, is on the line again and is generating power.—PPI

CSO: 5100/5704

SECURITY AT BATAAN NUCLEAR PLANT INCREASED

HK010021 Manila Far East Broadcasting Company in English 2330 GMT 31 Aug 82

[Text] The Bataan nuclear plant and other government installations in the province were placed under tight security in the wake of reports that subversives will blow them up as part of their nationwide terrorism, strikes and bombings this month. The export processing zone in Mariveles was also placed under heavy security. Also heavily guarded are the government arsenal in Limay, the two explosive plants in Limay and Balanga, and the oil refinery in Limay, which is the largest in the country. Bataan PC [Philippine Constabulary] commander, Lt Col (Benjamin Feliciano), said combat-ready troops have also been deployed in strategic locations in the province. Seaborne patrols were also organized to cover Bataan's coastal areas, particularly the shorelines where the installations are located.

The security measures in Bataan were part of the nationwide alert ordered by Armed Forces Chief Gen Fabian Ver to forestall the subversive plot to create nationwide chaos, leading to the seizure of the government.

Meanwhile, detained labor leaders Felixberto Olalia Sr and Crispin Beltran, who are facing charges for alleged subversive plot, denied the charges against them yesterday before the Supreme Court.

The high court heard their petitions for bail. Government lawyers led by Solicitor General Estelito Mendoza opposed the bail on grounds that persons detained under presidential commitment order are not bailable. Supporters of Olalia and Beltran held a demonstration in front of the Supreme Court. The high court gave the defense and the prosecution 10 days within which to submit their respective arguments, so the court can decide the bail issue.

CSO: 5100/2246

NUCLEAR ENERGY SYMPOSIUM AT PAKS

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian No 12, Dec 81 pp 521-536

[Article by Laszlo Kapolyi, academician, deputy secretary of the Ministry for Industry: "Second Nuclear Energy Symposium Held at Paks, 10-12 Sept 1981]

Introduction by ENERGIA es ATOMTECHNIKA

[Text] According to preliminary information, the symposium, organized jointly by the Paks Atomic Powerplant group of the Scientific Association for Power Engineering and by the Energy and Chemical Equipment Section of the Scientific Association for Machine Building, was identified as: preparation for the commissioning of the VVER-440-type nuclear powerplant units and experiences gained during that period.

Its purpose was to provide an opportunity for Hungarian and foreign experts to share their experience and to further their professional education in the following, detailed fields. The subject fields of the symposium were as follows:

1. Activities before the physical startup:
Pressure tests of the primary cicuit and its cleaning by circulation;
Testing and functional examination of the related systems;
First revision, thermohydraulic testing and second revision of the installations;

2. Physical startup of the unit:
Preparation required for loading, loading of the fuel and bringing the unit to criticality;

3. Power engineering problems in starting up the unit:
Increase of the performance to the nominal performance level, including measurements and checkup tests to be carried out during this period;
The 72-hour test operation of the unit and warranty measurements; and

4. Experiences gained from the operation.

The schedule of the symposium follows: Istvan Varga, secretary-general of the Scientific Association of Pow r Engineering, made the keynote speech.

After the presentation of Academician Laszlo Kapolyi, secretary of state of the Ministry of Industry, in plenary session, entitled "Preparations for the Commissioning of the First 440-MW Unit of the Paks Atomic Powerplant," the participants of the individual subject fields discussed the submitted and distributed papers on the basis of the general reports and supplementary information provided by the authors.

The following individuals served as chairmen and rapporteurs of the specific subject fields:

Subject Field 1/A: Chairman, Gusztav Jancsik, deputy director, State Supervisory Agency for Power Generation and Safety Technology (AEEF)
Rapporteur, Pal Nyerges, department head, AEEF

Subject Field 1/B: Chairman, Gyozo Verle, Electric Powerplant Investment Enterprise
Rapporteur, Pal Nyerges, department head, AEEF

Subject Field 2: Chairman, Zoltan Gyimesi, director, Central Research Institute of Physics
Rapporteur, Jozsef Vigassy, scientific collaborator, Central Research Institute of Physics

Subject Field 3: Chairman, Dr Tamas Zettner, director of Production, Hungarian Electric Works Trust
Rapporteur, Istvan Banyai, deputy chief section head, Hungarian Electric Works Trust

Subject Field 4: Chairman, Jozsef Ponya, general manager (Paks Atomic Powerplant)
Rapporteur, Andras Donko, group leader, Paks Atomic Powerplant

The conclusion was presented by Academician Gyorgy Vajda, deputy director of the National Atomic Energy Committee and director of the Electric Power Industry Research Institute. After the technical discussions, the folkloric dance group of the Szekszard Cooperative presented an excellent cultural program, which was very well received by both the domestic and foreign participants of the symposium.

Preparation for Kapolylon Start-Up Preparations

In the name of the Ministry of Industry and the Scientific Association for Power Engineering, I welcome with warm regards all the participants of the symposium. I feel highly honored to have this opportunity to present my thoughts as an introduction of the symposium, held on the eve of the commissioning of the Paks Atomic Powerplant--an event of epochmaking significance for power engineering and for engineering progress in Hungary.

You do not have to be told that like all national economies of the world, the national economy of Hungary is also searching for its proper place in a changed environment after the epochal change in worldwide economic

relations. Energy and raw-material policy represents a field of decisive importance in this search. During this, the structure of power generation has changed more than at any time in Hungarian economic history, especially since liberation. Considering either the modifications or the internal structure of the long-range global requirements, the extent of these changes represent the advent of a new quality. The construction of the Paks Atomic Powerplant plays a decisive role in this change of quality, this modification of power-generating technology.

At the beginning of the 1970's, for example, long-range plans for the 1980's reckoned with a total electric energy requirement of 75 to 78 billion kWh, predicting a level of more than 130 billion kWh for the turn of the millennium. The level for the 1990 segment is now set at 42 to 44 billion kWh; the requirement is not expected to exceed 62 to 65 billion kWh by the turn of the millennium. Calculations--or, actually, rules of thumb--that yielded good results previously about the doubling of the energy requirements every 10 years as indicated by earlier experiences, had to be modified. Results of the current calculations indicate that these requirements do not increase by even 50 percent every 10 years. Recognition of this between 1980 and 1990 caused the cancellation of an installed capacity of about 5,000 to 6,000 mW. This magnified greatly the relative importance of the construction as a source to be created, because until 1990 we do not contemplate building any other power source except the Paks Atomic Powerplant and electric energy to be imported from the Hmelnicki Atomic Powerplant.

At the same time, we are attempting to assert two main principles in the power generation system. First, the efficiency of the power economy should be improved to the highest possible extent; as far as possible, our energy rationalization program, primarily in the field of distribution and consumption, must be accelerated. According to the second principle, we must emphasize in the structural change very rapidly the viewpoint that as far as technology permits it, hydrocarbons, in particular petroleum, should be eliminated from power generation. This may be achieved by improving the level of refining mineral oil within the shortest possible time. This also increases the relative importance of Paks in the electric power system.

This change of structure is shown in figure 1. As shown, when nuclear power generation appears, the hydrocarbons are regularly losing out in the energy-carrier consumption of the electrical power industry.

A significant element of the power strategy is that in the future when we want to enlarge our electric power production capacity, we must rely primarily on nuclear energy and coal. In principle, we can assume that up to 1990 the structural change has been decided; for the period after 1990, we must consider alternative possibilities presented by coal and the atom. However, if possible we should not allow these two sources to compete against each other, but, relying on the emerging new sources, we should accelerate the rate of reducing hydrocarbon consumption. Such a change will result in fundamental modifications as far as the overall power-generating industry is concerned. To the extent that nuclear power enters the picture, a

technological basis should be developed within the cooperative system to satisfy peak energy demands. Thus, it will become necessary to realize as fast as possible the power-storing plant that has been preached.

The joint action of these three factors--the moderation of the rate of growth of the demand, the structural change of resources and, in the long range, basing the energy-carrier consumption of the electrical power-generating industry on nuclear power and coal--outlines how these two sources will be able to survive side by side and how they should participate in the system. The coal-based industry must participate primarily in resolving the problem of remote heating of large cities and, with the help of interconnected heat- and electricity-generating systems, providing remote heat to Budapest, Miskolc, Gyor and Pecs, while the nuclear powerplants will enlarge primarily the condensation-based fundamental powerplant system.

As a result, the participation of the Paks Atomic Powerplant will become an increasingly important factor in the national system because the rate of growth of the demand will slow. A new technological culture will appear. It is not sufficient any more to approach the problem of the long-range role of the nuclear power generation from the supply side but it is absolutely necessary to take into account to what extent the Hungarian industry will be able to participate in the construction program of the nuclear power-plant. In the case of both coal and nuclear energy, construction of the power-producing machinery and control technology are considered. These large-scale changes demand the theoretical and practical background, the high-level professional expertise that the domestic power-generating industry has possessed and on which it has been able to rely at any time to carry out its task.

In the case of Paks, it has been necessary to rely on an international division of the duties as it has not been experienced previously in the history of Hungarian industry. We had to rely on such an international distribution of labor by letting other countries, in addition to Hungary, participate in this international division of the tasks--most of the socialist countries serving as pioneers and, if you will, somewhat like beginners. Thus, the first unit will create the experimental basis; it will be part and parcel of the information data system on which the long-range nuclear powerplant construction program in Hungary will be based. From this point of view, we are not dealing simply with the startup of a unit but we enrich the informational material of people who shape, control and create the power-producing industry; these experiences will serve as the basis for future programs.

The realization of Paks--and also the rate of execution--plays a decisive role in the strategy of power-generating policy, coordinated to economic political goals. For this reason, the subject of this symposium is important in terms of how fast Paks can be brought on stream. In this connection, we must frankly look each other in the eye and admit that we have not been able to carry out the construction of Paks as far as we originally deemed possible. The currently accepted timetable--which foresees

the startup of the first unit by the middle of next year (1982)--is considered to set a realistic deadline; we must mobilize all our will, our spiritual and physical forces to fulfill it.

Startup at such a set rate is needed because any further delay will result in additional hydrocarbon consumption. It is well known that throughout the world every attempt is made to avoid as far as possible the use of hydrocarbons, in particular crude oil derivatives, for the generation of electrical energy. Use of crude oil exerts a strong negative effect on the external trade balance of all countries, including Hungary. Therefore, it is important to maintain the required rate without fail. The timetable is tight but realistic. The period from pressure testing to the startup of operation, as indicated in figure 2, implies that our forecast agrees with earlier Soviet, Bulgarian, GDD and Czechoslovak experiences. The period from the physical startup to the beginning of operation will also follow a tight but technically realistic program. It is very important to follow the pertinent timetable without fail. According to the earlier concept--when we considered using several power supply sources until 1990, because according to the previous plans, we expected that the Bicske thermal powerplant with 1,5000 to 2,000 MW, the Gabchikovo hydroelectric plant, electrical energy imported from Hmelnyiczki and the Paks atomic powerplant will be completed--an eventual delay would not be as important as today when the individual units of the Paks atomic powerplant represent the most reliable power sources until 1990.

It is very important that when we start the power production, we enforce a safety concept that, as far as requirements are concerned, passed through the same dynamic evolution as the technical side of the nuclear powerplant itself. The Austrian powerplant illustrates the burdens resulting from these safety requirements. When the powerplant will be started up again, it will be necessary to spend an additional estimate of 5 billion schillings for updating the safety features of the power plant, to ensure that after suitable modifications the earlier construction satisfies the current safety requirements.

During the commissioning of the Paks plant, a wide range of operations is needed, because until the power generation 200 systems must be started up and 30 percent of the overall system must be set in operation even before the first pressure test (fig. 3). This requires very close collaboration between the Powerplant Investment Enterprise, the Paks Atomic Powerplant Enterprise, Atomenergoexport and the pertinent Hungarian institutes. The number and the international character of the participants in the startup operations also reveal the very broad international division of labor in energy construction program. It represents perhaps the best example of the technological basis of the socialist economic integration.

From the technological viewpoint, the commissioning operations present a novel aspect: The Paks Atomic Powerplant Enterprise had to assume responsibility for this task in contrast with earlier powerplant construction practice, when the construction company took care of the startup operations. Startup is an exceedingly complex task. We will not be able to solve these

problems if we do not approach them imbued with the idea that creative people are working toward a common goal; imaginative intentions and a strong team spirit will create a golden bridge of understanding between the selfish interests of the enterprises. A major task of this size cannot be accomplished by rules and regulations alone, without considering the human side, the collaboration and cooperation of experts. I do hope that this symposium will make a significant contribution toward the further development and strengthening of human relations and fellowship. The already-mentioned enterprises do not work alone during the commissioning operations; they can rely on assistance from the Central Research Institute of Physics or the Electric Power Industry Research Institute. These institutes represent a reliable and internationally recognized basis, not only for the power-generating industry but for the Hungarian scientific life as a whole and, more specifically, for the scientific areas related to nuclear engineering.

The people who participated in the task received excellent preparation. To illustrate this, of the 1,600 authorized staff positions, half received specialized training abroad and about 50 percent received similar training in nuclear technology within the country. Of them, 22 percent of the total staff (fig. 1) received training in Hungary from a nonemployer. This proves two things: On the one hand, this nuclear powerplant will be started up by experts, on whom we can rely not only for the commissioning of the first unit, not only for 1,760 MW, but also for handling additional units. On the other hand, we have developed a domestic scientific background, on which we can rely for further training. This can be attributed to the experts and scientists in Hungary--in the institutes of the academy, in industry--recognizing that in the current period of scientific and technological revolution, nuclear powerplants and nuclear technology cannot be absent from Hungarian power generation. Even though we somewhat embittered each others' lives with a 5-year delay--with respect to the initiation of nuclear powerplants--the history of power generation demanded this period. However, its advent required suitable experts and they have been trained at the proper time.

Considering the start of the operation itself, it is well known that a law concerns the application of nuclear power generation and its safety in Hungary. A committee responsible for the commissioning of the Paks Atomic Powerplant has been appointed; it will enforce these rules and regulations.

The radiation protection and safety of the environment are guaranteed by a multiple system. On the one hand, the Paks Atomic Powerplant Enterprise operates processes that set a specific limit for the emissions. These systems are used to control the atmospheric contamination, the pollution, of the ground and the river basin, and to check the whole water cycle; in addition, meteorological data are recorded and any eventual release is checked, comparing the findings with limit values in every case. Thus, the safety system coordinated with the safety concept provides in every case a record to the emissions (fig. 4).

The second control system (fig. 5), which actually works independently of the previous one but again controls the system completely and guarantees a thorough safety and protection, represents the intake control by the individual agencies, whereby the limit values are set, including again the control of the meteorological conditions, the atmosphere, the ground, the water cycle, the biosphere, thus the whole biological environment with the intervention of the official agencies in cooperation of the state supervisory system. In the case of Paks, this means that the substantial increase of the investment burden completely satisfies the safety considerations. The authorization p.ocess of startup is scheduled in such a way that startup is not approved until the initial conditions are checked out by means of a specially defined systematic process, which takes all pertinent factors into consideration (fig. 6).

It is important that people participating in this symposium discuss their ideas so that when they leave, they will not simply convince each other that the safety philosophy operates correctly and all safety regulations have been fully considered. Rather, they should express this viewpoint in professional circles and in society at large with the needed emphasis. It is well known that many misunderstandings are encountered, many gossipy stories are heard about nuclear technology. In this connection I would like to examine the path selected by the Hungarian power-generation policy.

Supporters of the so-called soft strategy usually raise objections against nuclear technology but also against the increased consumption of coal. In their opinion, the rate of growth of the economy should be restricted to the level whose energy demands can be fulfilled primarily with renewable natural resources and which do not present a burden to the environment. As with industrialized countries in general, Hungary cannot use this approach. Therefore, we must choose the path of hard strategy, taking advantage of nuclear technology, coal and hydrocarbons in the form of a combined strategy for the energy and raw-material policy. The safety philosophy and environmental protection concept that we apply must fully ensure that the emissions from the technological system--interpreting individually the sources of contamination--are kept within the limit values to be expected at the current state of the art and that the intake is monitored continuously by means of a suitable control system.

I want to express my best wishes to this symposium, organized to provide an opportunity for discussing the commissioning of the nuclear powerplant. This confirms that a new technological discipline was created in Hungary, representing the latest stage in the history of Hungarian power generation.

Your achievement is similar to the creation of the unified Hungarian electrical energy system. At the last session of CEMA's Permanent Electrical Energy Committee, the representatives of all countries stated that the technological activities, the underlying concepts and the level of power generation achieved by Hungary are of an outstanding quality; Hungary participates as a technical partner in this cooperative electrical energy system. The construction of the Paks Atomic Powerplant is a worthy addition to the many achievements that characterized the Hungarian powergenerating

industry during the last few decades. The role that the Hungarian energy-generating industries and workers assumed is equal to the challenge presented to the technical intelligentsia; it indicates that we work as a part of an economy searching in a changed environment to find its place in the world economy. This search follows a course of quality assurance that never presented such strict conditions to us, perhaps since 1945, in its criterion system. We had to deal with the technological tasks of a national project, the magnitude of which can be compared only to the nationalization of the industry. The reconstruction after 1945, the collectivization of agriculture or the consolidation after the counterrevolution.

Without such a national accomplishment, the existence of the whole economy could be endangered; this question is of vital interest for all of us. In this light, this quality assurance approach will be followed. The Hungarian economy will fulfill these quality requirements during the coming decades; this is vouched by the fact that the technological intelligentsia, and more specifically the community of powerplant experts, is always able to solve the tasks that face us at certain periods of economic development. The critical task of the current period of economic development--specifically, of the Sixth Five-Year Plant and the portion concerning power generation--is the timely construction of the Paks Atomic Powerplant. I am asking the participants of this symposium to lend us their assistance and creative support to achieve this.

SUBJECT FIELD 1/A

The six communications classed in subject field 1/A contain two Hungarian and four foreign papers: Two are the work of Czechoslovak and one each of Finnish and Soviet authors. In summary, the following main considerations may be extracted from these papers.

In order to start the operation of the first unit of the V-1 nuclear power-plant at Bohunice in Czechoslovakia, following the example of the Soviet VVER-440-type plants already in operation, Czechoslovakia made an interstate contract with the Soviet Union, including the following points:

--provision of documentation, programs, operation instructions;
--direct participation of Soviet experts; and
--supply of various materials.

Villiam Ziman reported on the tasks arising from startup of the operation, training of the staff and personal and material conditions. The startup operations were divided into two phases at Bohunice:

--nonactive operations (scubbing, strength and tightness tests of the system, pressure tests of the primary circuit and scrubbing of the circulating system, first revision, hot tests, second revision) and

--active operations (physical startup, power generation, startup, 72-hour-long complex test operation).

The paper presents a good survey of the logical order of the startup of production, the structure, activities and relationships of the control and operating groups needed to carry out the individual processes and phases. The extent and complexity of the structure are similar to the system developed at Paks. (It is unfortunate that--perhaps because of space restrictions--the paper does not discuss or summarize the positive and negative effect of the experiences). The audience of the symposium probably would have been interested to know:

--to what extent the plan has been modified during installation;

--to what extent it was possible to fulfill the quality assurance requirements during the operational start-up;

--to what extent it was possible to ensure the independence and effectiveness of the quality control group; and

--what official control agency or authority (or authorities) functioned during the individual phases of the licensing process; what was their relationship with enterprises carrying out operations and, most of all, with the management of the nuclear powerplant operators, the vendors.

In connection with points A and B of the chapter referring to the thermo-hydraulic tests, two questions arise:

1. After evaluating the experiences of the Harrisburg accident, is the adjustment of the safety valve (Sempell) of the volume-equalizing container and the joint functional testing of the bubble container considered suitable?

2. What was the nature of the reconstruction of the load system of the pulse valves when the safety valves of the two generators were adjusted?

The next paper describes startup conditions and prerequisites of the systems and of the overall unit of the Loviisa II nuclear powerplant; it was prepared by Skytta, Lamroth and Kinnunen, the representative of the Finnish company Imatran Voima Oy. As known, units 1 and 2 of the Loviisa nuclear powerplant, which are also of the Soviet VVER-440 type, differ from similar units built in the Soviet Union and in the socialist countries inasmuch as this nuclear powerplant was built with a double-walled containment building, provided with ice condenser. Enterprises from Finland and other Western countries collaborated closely in the construction.

The paper emphasized an important requirement of the startup and initial operation period; the cleanup program of the individual components and systems. These operations follow each other in a prescribed order. The structure and operation of the agency authorizing the initial operation, as described in the presentation, appeared simpler than the organization developed in our country. In this case, the similarity is due to the Finnish Ministry of Commerce and Industry, as the licensing agency, asking the opinion and testing reports of several supervisory authorities: the Institute for Radiation Protection (IRP), advisory agencies such as the

Atomic Energy Council, the Advisory Committee for Radiological Protection (SSV) and the Nuclear Safety Council (ATT), before issuing the license.

The prerequisite for issuing the operating license depends on three reports approved by the advisory agencies, namely:
--the safety report reflecting the final state;
--the so-called preparedness (or evacuation) plan; and
--the summarized program of periodic inspections.
Of special interest is the second appendix, which contains the list of licensing operations (amounting to 27) in chronological order for Loviisa unit 2, together with the block diagram of the operation licensing process. We learn from this that only 7 months passed from the issuance of the license to load the fuel (19 May 1980) until the authorization to raise the power to the 100 percent performance level (12 December 1980).

In his presentation, Istvan Banyai surveyed the development of NUSS (Nuclear Safety Standards) of the International Atomic Energy Agency. The IAEA developed this safety series for its member states--primarily for the benefit of developing countries using nuclear power and building nuclear powerplants, although they have not yet acquired sufficient experience--in order to ensure that standard regulatory guidelines will be enforced in the countries in question.

In Hungary, the regulations and guidelines of the NUSS series are published by the Documentation Center of the Hungarian Central Technical Library under the supervision of the National Atomic Energy Committee. The IAEA issued safety regulations on the basis of a wide-ranging committee activity in five main areas:
--regulations concerning the governmental organization for the regulation of nuclear power plants (symbol G);
--siting (symbol S);
--design (symbol D);
--operation (symbol O); and
--quality assurance (symbol QA).
The regulations (codes) in these five main regulatory areas are supplemented by guides containing additional details about the regulations and providing useful assistance for developing the internal structure and legal regulatory system of the member states.

The paper about the principles of quality assurance of the domestic nuclear powerplant (its authors were Pal Nyerges and Zoltan Szonyi, staff members of the State Supervisory Agency for Power Generation and Safety Technology) discussed the requirements during design, fabrication and installation and also during startup and operation. With the help of simplified diagrams, the paper illustrated the interrelationship of the agencies, including the design, construction and supplying relationships derived from the Soviet-Hungarian supply contract.

As a coauthor, I would like to emphasize a fact mentioned in the paper. The Ministry of Industry is attempting to strengthen the quality assurance organization of the construction of the nuclear powerplants within a

suitable legal framework, taking into account that we are confronted with many problems not yet resolved or eliminated. Such problems are encountered in all developing countries, whenever the nuclear powerplant is turned over to the operator in not quite turnkey condition and whenever the technical and economic interests and the state of development of the country justify the largest possible participation in the construction.

The experiences gained from the operation of nuclear powerplants built abroad with the technical assistance of the Soviet Union have been summarized in the paper submitted by Malinin and Katunov, representing the Soyuzglavzagranatomenergo (All Union Association of the Energy Generating and Electrification Ministry of the Soviet Union). The Soviet Atomenergoexport concludes a special bilateral supply contract with the importing countries for starting up the operation of the VVER-440-type nuclear powerplants, guaranteeing in this contract that all basic conditions absolutely necessary to ensure the safety at startup and during the subsequent operation, will be fulfilled.

The assistance and supply by the Soyuzglavzagranatomenergo is provided through highly qualified Soviet experts who are sent to the nuclear powerplant for 1 to 2 years. Depending on the progress of construction or the state of the operation, the presence of the Soviet experts and their organizational structure varies, according to the requirements of the field in question, and their stay may extend 1 to 2 years.

The fields of activity of the chief experts of the advisory or operating groups cover the primary and secondary circuits, the control instrumentation and automation, the electrical installations and the water-chemistry and radiochemistry systems. Members of the operating group gained considerable experience with the powerplant installed and operated in the Soviet Union and also in the German Democratic Republic, Bulgaria and Czechoslovakia.

There are two main findings in the paper. The first one is according to the experience gained in the already mentioned powerplant the safety of the operation of the unit demands the presence of the operating group (at a strength of about six to eight persons) even during the subsequent period, during the years following startup of operation.

The second finding also refers to this time period. It appears in the form of collaboration or mutual relationships; the so-called partnership principle is used in the German Democratic Republic and the group principle in Czechoslovakia. In the paper, the first principle is preferred.

Finally, I would like to mention the statement related to the qualification, training formation, exercising, continued education of the operating personnel, which keep attracting increasing attention, in particular since the Harrisburg TMI-II accident, which caused considerable excitement throughout the world. I agree with the authors that the Soviet experts in the operating groups deserve great credit for the fact that the nuclear powerplants that they started up and are operating, do indeed function safely and reliably, while the utilization factor of the installed capacity

exceeds 70 percent, or even 80 percent in the case of units 1 and 2 of Kozloduy.

SUBJECT FIELD 1/B

Of the nine papers in subject field 1/B, six are the work of Hungarian and one each of Czechoslovak, Finnish and Soviet authors. The main lines of the content of the papers are summarized.

The paper presented by Dr Robert Taubner, Zsolt Texzy and Dr Lajos Voross, researchers at the Electric Power Industry Research Institute, described the instrumentation for the integrated leak-tightness measurement of the hermetically sealed building system of the Paks Atomic Powerplant. One of the most important, fundamental criteria of the safety concepts developed for the VVER-400-type nuclear powerplant built at Paks, is the assurance of the leak-tightness of the hermetically sealed system at a suitable level. The National Startup Committee prescribed successful performance of the so-called integrated leak-tightness test as one of the conditions for the issuance of the startup license. Investigators of the Electric Power Industry Research Institute have been making preparations for years to carry out this test; the paper represents their detailed study.

The basic requirement concerning the absolute pressure measurement principle--widely used also internationally--are reproducibility, accuracy and reliability. This applies to the whole instrumentation system, the measured characteristics such as the internal volume pressure, temperature, moisture content, time and also the collection and statistical processing of the measured data. The paper reported the results of the preliminary site inspection and the measurement program, supplemented by a list of the instrumentation to be used, a diagram reflecting the relationship between the specific leakage and the relative error limit, and a schematic diagram of the leak-tightness measurements.

The paper reflects a careful study, which is especially significant because this is the first time that the integral leak-tightness measurements of hermetic systems according to the requirements of the new safety concept have been carried out in Hungary. It is regrettable that no report has been presented at the symposium on the local leak-tightness measurements (leakage tests of orifice closing systems, of piping and cable penetrations) that precede the integral leak-tightness tests. It is not possible to sense the relationship of these two factors: the effect of local leakage on the integral leak-tightness side by side.

The next paper, which discussed the positioning of diagnostic sensors in the primary circuit needed for the startup measurements of the Paks atomic powerplant, was presented by Elod Hollo, Peter Siklossy and Moklos Kovacs, staff members of the Electric Power Industry Research Institute and the Paks Atomic Powerplant. Diagnosis of vibrations in the primary and secondary systems of the nuclear powerplant is not only a novel testing procedure in Hungary, arising during construction of the first nuclear powerplant, but it

is part of an extended research and development activity aimed throughout the world to eliminate deleterious mechanical vibrations.

The investigation primarily covered the reactor container and its components, the main portions of the primary loops and their most important systems and the direct or indirect measurement of the vibration pattern of the turbo-generator unit. The study considered the solution of positioning the sensors of the vibration-diagnostic system in the primary circuit of the first block of the Paks Atomic Powerplant, their possible gradual extension and eventual modification. In the first unit, 41 instruments sensing the acceleration of vibrations and 9 pressure-fluctuation sensing instruments were installed. The measurement program was briefly outlined in the paper, mentioning the more advanced concepts planned for other units of the power-plant, and potential collaboration with CEMA countries in this field.

In their study, Karoly Pahota, Peter Tilky and Andras Wagner, staff members of the Chemical Construction Organization, the Paks Atomic Powerplant and the Electric Powerplant Investment Enterprise, considered the examination, pressure testing, circulating, scrubbing and functional testing of the water-purifying systems. The preparation and the handling of media and solvents in amounts and at a level of quality satisfying the technical requirements, were ensured in the primary circuit by:

--the pure condensate system;
--the chemicals storage and preparation system;
--the primary-circuit emergency water and boron-regulating system;
--the nos. 1-6 special water-purification system;
--the system handling the decontaminating solutions;
--and the liquid-waste storage system;
and in the secondary circuit by:
--the condensed-water purification system.

Many mechanical and chemical tasks arise while this water-purifying system is built, including execution of the washing, scrubbing and internal cleaning tasks, creation of temporary units and circulation loops, mechanical testing and revision of pumps and installations; they usually became necessary while these operations are carried out at the site. Because of changed circumstances, urgent action is often required of enterprises involved in planning, construction and operation, the Soviet experts and, last but not least, by the Paks Atomic Powerplant Enterprise operating the unit.

Realistic problems from previous experience are cited in this paper; most of them are due to errors in design and execution, insufficiently fulfilled quality-assurance requirements and a certain slackness in the control and inspection activities. It is a special merit of the study that it presents proposals for solving or eliminating these problems.

In his paper, Herman Miroslav, representing the Czechoslovak Scientific Research Institute for Nuclear Power Generation, reported on the materials testing carried out on the main components of units 1 and 2 of the Bohunice

V-1 nuclear powerplant. The following main components were tested: the 500-diameter main circulation piping, the connecting piping of the volume-equalizing container, the main closing valves of the 500 piping, the hydraulic sections of the main circulating pumps, the steam generators, the volume equalizer, bubbling container and the filters of the special water purifiers.

The structure of the agencies and organizations directly involved in the control, in which the staff and the consultants of the nuclear powerplant play a major role, is described in the paper. Among the testing methods, the visual surface examination techniques, with a manipulator connected to a TV camera, has been preferred, since it is the only method to approach in a reproducible manner the individual tests after startup of the operation.

The control test for power startup on these components was carried out in three stages:

--after the pressure test of the secondary circuit;
--after the first and second pressure tests of the installations, at the time of the first revision; and
--after the third pressure test, at the time of the second revision.
The time needed to execute the control tests was affected by the demand to provide thermal insulation and to purify the surface to be examined. On the other hand, the three-stage control operation described in the paper, decreased the time demand of the first and second revision.

The following problems have been discussed in the paper, indicating that they still await solution: ensuring the superficial cleanliness and fineness of the stainless-steel systems and piping, installation of thermal installation that can be handled easily and rapidly, especially at locations exposed to radioactive radiation.

Finally, the paper emphasizes the importance of recording and storing documentation, to make it available for periodic rechecking. The symposium should give its complete approval to the proposal stated in the paper concerning the mutual exchange of experiences and information, the computer-based recording and processing of results by the CEMA countries.

Janos Gado, candidate of physical sciences and a staff member of the Central Research Institute of Physics, discussed the core-physics calculation of VVER reactors. The department of reactor physics of the Central Research Institute of Physics adapted the BIPR-5 computer program of the Moscow Kurchatov Institute for the Paks Atomic Powerplant. The paper implies that at an acceptable safety margin, the BIPR-5 program is well suited to plan loading, reloading and operational processes.

Programs are available at the Central Research Institute of Physics; these may be used to determine other data of programs used to calculate the whole reactor core (lag, boundary parameters, kinetic parameters). Results of the core physics calculations should allow establishing a more stable basis to estimate the service life of the campaign, the unevenness factor of the heat distribution and the burnout at the end of the campaign.

The paper also considered questions of economical character related to the BIRP program of the microdistribution within the fuel-element bundle; the related coarse-net process, currently under development; and the determination of the isotopic composition of fuel element bundles. The BETTY computer program may be used to determine the relationship betwen the isotopic composition and burnout and between the neutron-physics parameters and burnout.

In the paper presented by Tuominen, Pietikainen and Kutramoinen, representing the Imatran Voima Oy Company of Finland, the steel containment and startup of the connected system was examined. The Loviisa nuclear powerplant has been mentioned; it has been also stated that the VVER-440-type system under construction at Paks has a different design for the safety building (containment, system of leaktight rooms). The integral air-tightness testing of the sealed rooms was also mentioned; in this connection it has been pointed out that no report about the local tightness testing has been submitted to the symposium. This omission has been remedied in part--albeit in a different respect--by this paper, since in the detailed description of the ice-condenser containment system built at Loviisa, the leak-tightness testing of conducts, personnel and safety locks and various other penetrations is mentioned.

Bela Farkas and Gyorgi Makadi reported on behalf of the Paks Atomic Powerplant on the inspection plan for incoming goods and on experiences gained in the field of nondestructive testing. The purpose of the nondestructive testing specified for the incoming goods control test is to make random checks about the adequacy of the main components, piping and armatures of the primary circuit. The study has been extended to cover the base material of the components and their welded joints. The permissible discontinuities in the base materials and welding, their location and extent, were determined by nondestructive testing.

The ultrasonic method was used to an increasing extent, in addition to conventional radiographic, penetration and ferrite content measurements, for studying austenitic primary components, welded piping joints. The Paks Atomic Powerplant carried out the ultrasonic tests for information. The reproducible incoming goods control tests represent the recording portion of the so-called zero state.

Based on experience, an attempt was made to render the incoming goods control tests even more reproducible and to develop further the ultrasonic testing techniques.

The next paper was submitted by Peter Nagy, a staff member of the Paks Atomic Power Plant. The Komplex Uran-2 information computing system for powerplant process control has been used in Hungary for the first time among the CEMA countries, with the construction of the Paks Atomic Powerplant after application within the Soviet Union. Its operation is controlled by SZM-2 computers. Its related systems are the M60 device, the Orion-M graphic representation system as hardware unit, the SEYVAL as an information subsystem --which will be realized only after the test operation--and the HINDUKUS

installation, which takes care of the internal control of the reactor and will provide valuable information for the Komplex Uran system. The paper emphasizes that the fulfillment of the demand of the Hungarian-language presentation posed a special problem for the people working on startup.

The paper submitted from the Soviet Union by Kapunov, entitled "Organization and Execution of Fuel Reloading and Planned Revision in a VVER-440 Reactor Unit of a Nuclear Powerplant," described two types of reloading. The first type is carried out annually when one-third of the burntout fuel removed from the core is replaced with fresh fuel. At the same time the lattice is checked and intermediate-level repairs are carried out. The second type of reloading involves the complete removal of the internal components and the core. The system is rechecked and major repairs are carried out.

On the Basis of experience gained in the Soviet Union, the first major (type 2) reloading of a newly commissioned powerplant is carried out during the 2nd year after start of the operation, after an operating period of 15,000 to 20,000 hours, together with checkup and major repairs. After that, type-2 reloading is scheduled only for every 4th year.

The paper states that in the course of the fuel reloading, the Soviet Union ensures the conditions needed by the client-buyer within the framework of technical assistance program. The technical assistance is provided on the basis of a contract between the Soviet party and the foreign-trade agencies of the client. The need for such a technical assistance based on a contract is justified in detail in the paper.

Briefly, this activity involves a large volume of design, organization and preparatory work. Not in the least, it lies in the interest of the client that its operating personnel, which does not yet have sufficient experience, will use suitable safety precautions to carry out this dangerous process.

Regardless of the type of reloading, experience indicates that the preparations and planning for the reloading operation may be divided into three periods. The first period--which starts as early as the first days of operation of the nuclear power plant--requires a 3 to 5 year period for the detailed planning of the revision and maintenance operations.

The second period involves the elaboration of the required documentation, the organization of the devices, materials, spare parts and work groups. It should be completed at the latest 25 to 30 days before shutdown of the reactor to be reloaded. The third period is actually the licensing period. At that time, the documents are checked and approved by the competent authorities.

According to current experience, the time requirement for the first type of reloading is 30 days and for type 2, 55 days. The decrease of the shutdown period depends greatly on the quality of the work carried out during the preparatory period.

SUBJECT FIELD 2

Eleven papers were submitted for subject field 2, including seven representing the work of Hungarian authors; one was submitted by a Finnish, one by a GDR and two by Czechoslovak authors. Four papers are of a general nature, involving measurement programs. Because of their subject, they can be compared. Two other papers discuss similar problems, namely, the measurement of mixing in the mixing chamber, and the effect of the mixing. Therefore they can be jointly summarized. The other papers cover relatively independent subjects; therefore we will describe them individually. In order to emphasize the interrelations, we will discuss the papers in a certain logical order.

Among the papers with a comprehensive character, the article by IVO engineers, V. Sorri and H. Lamroth, entitled "Organization of the Fuel Loading and Physical Startup at the Loviisa 2 Nuclear Power-plant," should be mentioned. Of course, they not only describe how the work was organized but also discuss the unexpected events encountered during the work and list chronologically the activities to provide protection against these events. The events described in the paper covered about one-half year during the 1980 calender year. The material contains a lot of useful information that might be of interest for the people involved in startup operations at Paks. The authors compared in a colorful manner the events with those during the corresponding phases of startup operations of the Luviisa 1 unit. Their precise, detailed work deserves appreciation.

Let us now mention from among the comprehensive studies the study of the VUJE engineers, S. Rohar et al., entitled "Experiences of the Physical Startup of the V-1 Nuclear Powerplant." In this paper, the emphasis is not on the way startup operations were carried out; rather, the startup measurement programs and the results obtained during measurement are compared not only with each other, as the case of the two Bohunice units, but with other Bulgarian and CDR VVER-440 units and even with the startup measurement programs of other reactor vendors.

The carefully compiled material contains information on detailed questions, such as the role of the measurements carried out with the RZEZ TR or the Csilleberc ZR-6 reactors in preparation for startup and in the tests with the BIPR-5 program. The large volume of measurements and calculation material has been effectively summarized in 4 tables and 11 figures. These may be used not only for the preliminary planning of physical startup but also in the evaluation of certain questions related to operations.

On behalf of Paks Atomic Powerplant, Physicist Laszlo Turi, department head, described to the international group of experts the physical startup program of the Paks unit 1 on the basis of the concepts as of spring 1981. The material was quite widespread and it was obvious that the program has changed in a number of detailed questions. Therefore, it would be desirable to hear more about these changes and the evolution of these concepts.

One of the work groups of the Central Research Institute of Physics accepted the assignment to prepare and to manage a portion of the startup measurements, certain specific thermohydraulic measurements of Paks unit 1. This portion includes several measurements, which are scheduled to be carried out during physical startup. The paper prepared by Dr Laszlo Szabados, division head, and his associates summarizes all the activities and the pertinent preparatory work for which the thermohydraulic department accepted responsibility during various phases of startup. The concepts and studies described agree with the previous paper.

Two authors from the GDR, Dr G. Ackermann, professor at the Technical Universtiy of Zittau, and Dr H. Melhior, engineer at the Ministry for Higher and Technical Education in Berlin, submitted an interesting article. The title of their paper was "Thermohydraulic Studies during Startup of Operation with the examined VVER-Type Pressurized Water Reactors." The paper examined the mixing of the primary cooling water flowing through the individual loop and its effects. The conclusion of their study was that the core is uniformly cooled, even if the number of loops in operation is smaller. However, if the steam generator is disconnected only at the secondary side, then an asymmetric temperature field is created in the water entering the reactor core, which causes a distortion in the performance distribution. The authors attract attention to the fact that in the lower mixing space, the mixing is far from complete. They urged additional plant measurements in order to determine more accurately the mixing factors and proposed taking results into consideration when determining the permissible reactor performance if the number of loops is reduced.

In the first part of their presentation, Dr Gyorgy Ezsol and his associates (Central Research Institute of Physics, Budapest) propose a combined evaluation method for the in-core thermoelements calibration measurements and for the determination of the mixing factors. It appears that the results obtained by the proposed evaluation method may be used for the purpose mentioned in the previous paper from the German Democratic Republic. In the second part of the paper, problems arising in the course of the measurements of the primary circuit flow were outlined; the preparation of the small-scale calibration experiment, which is under construction, were described.

J. Kott (Skoda Works) discussed in his paper an interesting subject area of the power engineering study of fuel elements.

Zoltan Pammer and Laszlo Szabo, engineers at the Electric Power Industry Research Institute, described their program system, which was developed to analyze the strength of bodies with a complex shape and stress, based on the finite element method. They illustrated this with the help of an application concerning a container study of the VVER-440.

Dr Sandor Benedek, senior scientist at the Electric Power Industry Research Institute, also described a computer program in his paper. This program was prepared to analyze transients in the primary circuit during operation and breakdown. For illustration, he presented an analysis in which one of the six main circulation pumps has broken down.

Dr Erno Petz and Albert Hetzmann, Paks Atomic Powerplant Enterprise engineers, discussed the control circuits of the first unit of the Paks Atomic Powerplant. After describing the structure from the viewpoint of instrumentation, they emphasized the questions important for preparing for operation, such as training of the instrumentation and control personnel and laboratory testing of the control circuits.

Physicist Dr Janos Valko and his fellow authors from the Central Research Institute of Physics described the application of the installation method for reactor physics parameters during physical startup. This system contains a CAMAC microcomputer. After summarizing the processes and signals to be measured, they specified the installation system and then described the computer program which controls the measurements. Finally, a computer program for calculating the value of reactivity was discussed.

SUBJECT FIELD 3

Of the 11 papers in subject field 3, Hungarian authors presented 3 papers. Of the articles from abroad, 6 were the work of Czechoslovak authors, 1 was Finnish and 1 originated from the German Democratic Republic. Since our goal was primarily to present practical experiences to assist in startup operations, this ratio was acceptable. It is a difficult task to highlight any of the papers because of present new knowledge and, what is even more important, communicate practical experiences to us.

The study by Sandor Desi and Dr Egon Szondi, who are working with the educational reactor of the Budapest Technological University, described the instrumentation used for the selective measurement of the radioactive rare gasses released with contaminated effluent air through the ventiliation stack of the nuclear powerplant. The application of such a system is justified by the need to track the radioactivity released from the nuclear powerplant and to identify the data collected in the course of measurements for environmental control.

The authors summarized clearly the functional structure and the services rendered by the system. However, the illustrations of the study are less satisfactory. It would have been desirable to present some transparencies and to illustrate the output of the on-line evaluation program.

The study of Zsolt Toth, Dr Zoltan Bessenyei, Laszlo Marcsa and Istvan Fugedi, engineers at the Electric Power Industry Research Institute was a very lucid presentation of the structure of the vibration-diagnostic system to be built at the powerplant. The authors are on the right track when they publish their own comments concerning the solution of practical problems encountered during construction. Such problems are, for example, extreme environmental conditions for amplifiers installed in the primary circuit or the high-current perturbances for the signal transmission.

In view of the fact that the vibration diagnostics already have a large international literature and that the authors are recognized experts of this

field, it was to be expected that they would present the current state of vibration diagnostics with particular consideration of applications to nuclear powerplants in an introductory survey. Unfortunately, certain services considered fundamental for the operation of the system have not been presented. Thus, for example, the identification analyses have been mentioned in the paper only in one-half of one sentence.

Stefan Kacmary and Jozsef Ricani, staff members of the Scientific Research Institute for Atomic Energy at Jaslovske Bohunice, presented a concise survey about startup of the standard Soviet programs with the help of units 1 and 2 of the Bohunice nuclear powerplant. Within this subject, they discussed the thermohydraulic and physical startup and ascension to power. The experimental data-collecting and processing systems, described in a separate chapter of the study, which supply supplementary information, operating in addition to and in parallel with the standard process control system, are of special interest for Hungarian specialists.

In the concluding section of the study, the authors summarized their experiences in the following way:

--The developed inspection program must be considered a standard one.
--The inspection program must be carried out in its entirety.
--The amount of measurement parameters and the number of starting cycles indicated in the plan must be adhered to;
--The collection of qualitative data and information processing in the course of the physical and startup power ascension operations must be ensured.
--Every attempt must be made to ensure quality of the complex individual and partial inspections.

These statements should not be considered as experience but as a fundamental requirement. The rich and highly pertinent references of the study very well supplement the provided information.

The paper submitted by Ivan Jaros, another staff member of the Czechoslovak Scientific Research Institute for Atomic Energy, also examined the starting-up problems of unit 1 of the Bohunice nuclear power-plant, describing specifically the inspection method used to study the state of the main circulating pump and the detection of particles precipitated or released in the primary ircuit.

The spectra presented in table 4 illustrate the inspection carried out with the presented vibroacoustical diagnostic system. Of special interest are the concluding points concerning the economic considerations of the application of vibroacoustic diagnostic systems.

One must agree with the author's conclusion that the CEMA countries should compile a catalog of diagnostic systems for nuclear powerplants. This is a very constructive proposition indeed; it means that information in this subject area should be kept up to date for the benefit of interested parties.

Jan Tomik, Stefan Vojtek and Stanislav Stanc, also staff members of the Czechoslovak Scientific Research Institute for Atomic Energy, indicated in their paper how the accuracy of the temperature measurements carried out laboriously and with great care in the primary circuit is guaranteed, in spite of the influence of meteorological factors. The question appears only to be a partial problem; however, the paper refers to a publication in ENERGIA ES ATOMTECHNIKA, nos. 5-6, 1979 (1), which illustrates its fundamental significance. The indicated extent of the inspection and the anomalies encountered previously and during operation, illustrate well how important it is to fulfill the testing and quality requirements concerning temperature measurements; this should be emphasized. The experimental results presented in the paper prove unequivocally the importance of inspection before installation and during operation.

Vlazej Losonski, another staff member of the Czechoslovak institute, described the peculiarities of the self-regulation of the reactor, which may be experienced in the course of the control processes at the ascension to power of the unit. The author started from the premise that the tests carried out at zero performance level are not sufficient to ensure the safe and economical operation of the nuclear powerplant, giving an excellent survey about the processes based on self-regulation tests carried out at the time of the power ascension of the Bohunice units. They were aimed at the determination of:

--the reactivity coefficient and differential effectiveness according to performance of the regulating cassettes and
--the thermal coefficients of the reactivity.

In the concluding section of the study, the author mentioned certain modifications carried out on the reactor; the safety compensation in the self regulation arises as a result of these modifications. It would have been desirable to obtain brief information about these arrangements, their character and effect.

Ivan Simerka, also a staff member of the Czechoslovak research institute, reported on the dynamic tests carried out on units 1 and 2 of the Bohunice Nuclear Powerplant, at the 35, 55, 75 and 100 percent performance levels. The conclusions drawn from the experience gained during the tests may be also expressed in the form of requirements.
--The faultless operation of the water-level regulators of the steam generators must be ensured.
--It must be ensured that the breakdown of any of the operating turbines will not initiate a transient fault series, which would result in the groundless breakdown of the other turbine.
--The continuous and troublefree power supply of the control system must be ensured.
--The effect of the adjustment parameters of the controls must be determined during preliminary tests.
The diagrams presented in the paper supplement the material quite well.

Josef Zadrazil and Josef Hermansky, similarly staff members of the Czechoslovak research institute, also studied the inspection of units 1 and 2 of the Bohunice nuclear powerplant. The extremely precise and detailed study described valuable practical problems about measurements of the hydraulic characteristics and about flow and pressure tests when the main circulating pumps were disconnected or have broken down.

A. Laukia and K. Porkholm, staff members of the Finnish Imatran Voima Oy Company, described the dynamic tests during the ascension to power of unit 2 of the Loviisa nuclear powerplant, including the study of the load response properties of the unit. The authors followed up in detail the states of drop of load, loss of the feed pump, drop of the reactor from the nominal performance level and main load reduction.

The study of the load response properties was extremely interesting. Its final conclusion was that the unit:

--is able to carry out a performance change of ±5% within 30 seconds at the 80 to 100 percent load range or

--is able to carry out a performance change of ±20 percent within six minutes.

In judging these data, it should not be forgotten that the level of control technology of the Loviisa unit is higher than that to be installed into the Paks Atomic Powerplant. The authors emphasized the importance of the discussed tests, not only from the viewpoint of suitability, safe operation, and verification but also for the training of the operating personnel.

Karoly Hegyi, degreed physicist and staff member of the Paks Atomic Powerplant Enterprise, described the complex diagnostic system to be installed in the Paks Atomic Powerplant. The system will include input in the primary circuit about:
--vibration of the reactor container;
--vibration of the main components;
--vibrations of six selected control and safety protection media;
--pressure fluctuations of the primary coolant;
--pressure fluctuations within the core;
--6-6 selected in-core detectors and ionization chamber noise signals; and
--6 operational thermoelement noise signals;
together with the installation of the previously discussed turbine bearing acceleration input into the secondary circuit.

The study summarized quite well the systems technology of the planned complex. It was mentioned that the detailed evaluation will be carried out on an R-40 computer. After an initial off-line evaluation, the system is to be transformed into an on-line measuring system.

The question arises in connection with the preceeding two statements why the output of the complex does not figure in the plans or, in other words,

the author's casual remark that the complex would be further developed into an on-line measuring system should be further clarified.

In his study, Jukka Timperi, a staff member of the Oy Finnatom AB, summarized the operational experiences obtained with the Ahlstrom DXU-50-R type 2 m^3/sec cooling water pump. This type was developed specifically for the VVER-440 unit.

It was learned from this study that, in spite of the fact that the goal of the development work was known and the testing of the prototype was successfully completed, the pump became reliable only after several structural modifications were made. The anomalies observed in the course of the operation and the steps taken to prevent them were quite instructive.

SUBJECT FIELD 4

Of the 10 papers in subject field 4, 3 are the work of Hungarian, 3 of Finnish and 4 of Czechoslovak authors. Their common characteristic is that they provide practical knowledge about both startup and operational procedures. According to the work of A. Laukian, P. Skyttan, S. Merisaari and I. Tuominen, of the Finnish Company Imatran Voima Oy (IVO), entitled "Power Ascension and Startup Phases of a Nuclear Powerplant and Results Obtained," at the time of the start of the operation of L 2, the goals of IVO were as follows:

--to satisfy the official requirements in order to start operation as fast as possible;
--to obtain the zero level data of components and systems to be used during subsequent operation and maintenance;
--to acquire experimental and operational data to help with the preparation of final regulations for operation and breakdown prevention;
--to verify assumptions as far as possible;
--to perfect the operational processes and to acquaint the personnel with the plant;
--to make use of the experience gained during the operation of Loviisa, and 1;
--to employ the company's own personnel in all possible fields, to ensure that IVO has a cadre of well-trained experts to plan new nuclear power plants.

These goals have been successfully reached. The authors detailed the main periods of the commissioning operations from the purification and inspection of the components until the 14-day trial operation. They itemized the tasks to be completed during the various periods together with the pertinent timetable. The organization of the ascension to power was also briefly outlined.

Loviisa 2 could have been placed into operation more rapidly but the period was extended for several reasons, such as a fracture in the reactor container mantle, welding problems with the steam generator and main gate valve, and the TMI-2 accident, which necessitated additional tests. Probably

as a result of the experience gained with Loviisa 1 and the excellent atmosphere of collaboration between the Finnish and the Soviet workers, individual phases of startup, especially the period of the power load increase, were greatly reduced.

According to the paper entitled "Experiences with the DXU-50-R-Type Main Circulating Pumps, Installed in the Loviisa 1 and 2, VVER-440-Type Nuclear Powerplant" by Engineer Jukka Timperi, a staff member of the Finnatom AB, several minor problems were encountered with the Loviisa 1 pumps. These construction and startup-related problems were due to the prototype nature of the pumps, which have not been eliminated during the 4,000-hour-long laboratory prototype testing.

During its half-year operation, Loviisa 2 did not stop functioning because of the cooling water pumps. The pumps could be easily maintained. During maintenance operation in 1979, six pumps were completely dismantled, checked and reassembled by four specialists in 3 weeks.

According to the paper entitled "Load Change Potential of the Nuclear Powerplant Steam Turbines" by Dr Botond Czinkoczky, adjunct professor, Chair of Thermal Machines of the Budapest Technological University, the steam temperature in units operated with a pressurized water reactor is significantly lower than in the conventional thermal plant units; in spite of this, heat stresses appeared in the turbines. In his paper, the author analyzed these problems, primarily on the basis of Soviet literature.

He stated that the load-change rate of the nuclear power plant is limited by the turbine. This is due to the following.
--The saturated or wet steam has a very high heat-transfer coefficient. The surface temperature of the housing wall follows practically without delay the temperature change of the steam. In view of this, significant temperature gradients are established within the wall of the turbine housing. When the load is reduced, the temperature of the steam is significantly lowered.
--Under the influence of thermal stresses, the planes of division open, leading as a result of the presence of wet steam to the evolution of silt erosion.
The author supplied a large volume of information, mostly on the basis of VTI calculations. He described the algorithms of turbine startup, which made it possible to start up and to load automatically the modernized K-220-44. This is used at the Loviisa Nuclear Powerplant in the Siemens-KWU variant.

According to the contract, it is not desirable to increase the performance of the turbine by removing the high-pressure preheaters, because the moisture content of the steam would rise to unacceptable levels. This is permitted in the case of the modernized K-220-44.

The same author submitted to the symposium a paper entitled "The Main Control-Instrumentation Characteristics of Nuclear Powerplant Steam Turbines," in which he discussed the requirements related to the control of the

powerplant units from the viewpoint of their ability to accept fast load changes in the cooperating electrical power system. This inclusion of a nuclear powerplant unit into the frequency regulation of the network was studied by the Soviet VTI, at the Novovoronezh nuclear powerplant, where the transient functions of the unit were measured in the case of the sudden insertion of the control rods of the reactor (loss of load). When the control valves of the turbine are opened, the steam absorption and performance of the turbine in the secondary circuit increases rapidly, under the influence of the stored heat. In the case of the increased heat removal at the secondary side with the control valves open, the saturation parameters (temperature, pressure) in the steam generator are decreased and the steam absorption and performance of the turbine increases rapidly, resulting in the increase of the heat flow from the primary circuit.

The Soviet turbines allow two modes of operation: frequency regulation and combined frequency and live-steam regulation. There is an electrohydraulic control system with a maximum insensitivity coefficient of 0.06 percent. The average accuracy of the power level is 1.5 percent. Since the VVER-440 reactors contain two turbines, good, efficient, quantitative regulation may be achieved by loading them in succession.

The paper of engineers M. Kozak and P. Klima, staff members of the Czechoslovak Scientific Research Institute of Nuclear Power Engineering in Jaslovske Bohunice, described the operational experiences of units 1 and 2 of the Bohunice V-1 nuclear powerplant. When the paper was written, the authors were not able to compare the first campaigns of units 1 and 2 because unit 2 had not completed its own run.

Nevertheless, startup and operational results of unit 2 had been more favorable than those of unit 1. This is due not only to the experience gained with unit 1 but also to the activity of the enterprises participating in the installation work and operational startup.

At the very beginning of the power ascension operations, considerable attention was devoted to reliability and safety. The reasons for deviating from normal conditions were carefully analyzed in cooperation with the Soviet experts. From the start, the problem of economical operation also attracted their attention. They found that the continuous condenser-purification system was the most efficient step for improving the economic efficiency. Between 1978 and 1980, 297 solutions were adopted. The authors stated that the economic efficiency and operational safety of the VVER-440 unit may be further improved--among other steps, by improving the level of knowledge of the operating and technical staffs and by developing standardized maintenance specifications.

J. Bunta, a staff member of the Czechoslovak Scientific Research Institute for Nuclear Power Engineering, was the author of the paper entitled "Execution of Nonoperational Measurements and Their Utilization for the Study of the Power Regulators of the Reactor and the Turbine at the Time of the Ascension to Power of Units 1 and 2 of the Bohunice V-1 Nuclear Powerplant." According to his definition, the concept of nonoperational

measurement refers to measurements, the sensors of which have been installed according to the design, but the signals had to be processed or recorded or the sampling frequency had to be increased.

The goals of the investigations were:
--checking the functions of the regulators;
--checking the effectiveness of the regulators;
--checking the joint operation of the regulators; and
--improved precision of the adjustment of the regulators.

Results included:
--determination of the low- and high-performance operating modes;
--transfer of the pressure sensor to the main steam collector;
--satisfactory joint operation of ARM and TVER at unit 2;
--other modernization activities; and
--startup of subsequent units requiring the most up-to-date instrumentation and computers.

The paper of Marian Krajchovic, a staff member of the Bohunice research institute, had as its subject the control of the operation of the reactor in case of the natural circulation of the heat-transfer agent. Natural circulation is obtained under the following conditions:
--last stage cooling after normal shutdown and
--shutdown of all main circulating pumps, emergency shutdown.
The author described the course of the tests, mentioning certain restrictions. The measured values and their recording were indicated in detail in tabular form. The results from units 1 and 2 were different; this was due to the following:
--differences in the input temperatures;
--differences in the system;
--geometric deviations in the primary circuit;
--inaccurate measurements.

The results of the tests are commensurate with those obtained in the Soviet Union, German Democratic Republic and Bulgaria. Cooling of the core by natural circulation was found to be acceptable.

In the paper authored by Milan Cvan, Jan Trukus and V. Polak, staff members of the Czechoslovak Scientific Research Institute for Nuclear Power Engineering, the thermal operational safety of the core in the first unit of V-1 during the first operational period was investigated. The authors studied the evolution of the heat-transfer crisis, using the results of operational parameters. They described briefly the applied method and indicated how the measurement results were processed. The results were presented in a tabular form for eight different states.

The results indicated clearly that during its first operating period, unit 1 of the V-1 nuclear powerplant did not reach the critical source and operated with a sufficient reserve. This amounted to a double safety.

According to the study by mechanical engineer Janos Tallosy, a staff member of the Paks Atomic Powerplant Enterprise, entitled "Preparations for Controlling the Operation of the Paks Atomic Powerplant," the VVER-440-type units of the Paks nuclear powerplant are being built with a new safety system that localizes the breakdown. Beyond this, the difference with the earlier similar unit consists in the operational control being assisted by a high-capacity informational computer system, Komplex Uran-2.

The Paks Atomic Powerplant Enterprise developed a task series for this informational computer system, recording expectations for the information system. This was needed because qualitatively the installed system makes a different operation management and control possible, while the development of the new computerized user software introduced into this system lagged behind. According to the task plan, the development of the basic data system for the information needed for operation was initiated. The daily operational information programs and the control algorithms prepared with the help of the heat-balance system are being developed. They may be used to assist the search for causes of eventual deviations and to make their effects apparent. By using the system on an informational computer, up-to-date information about the operation of the powerplant may be made available.

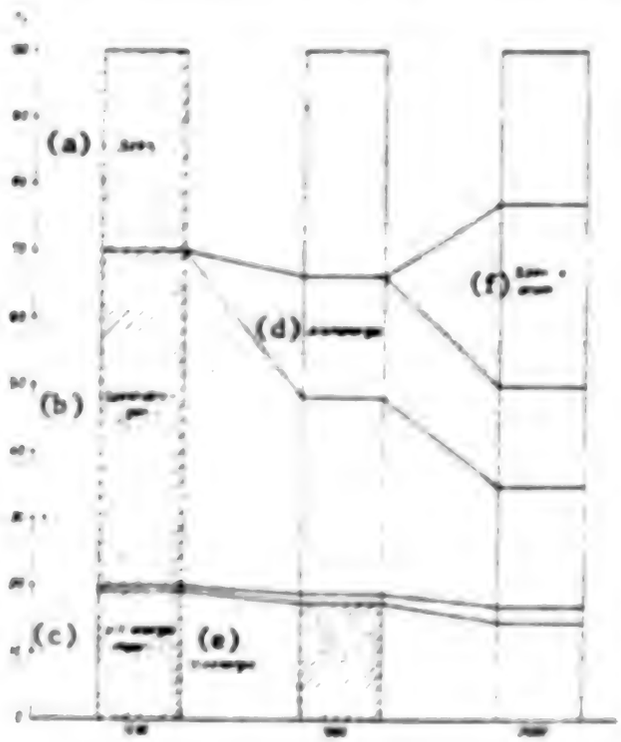


Figure 1. Structure of the consumption of the energy transfer agent of the electric power-generating industry (Hungarian Electrical Works Trust). (The designation "hydraulic power" follows that of the "imported electric power.)

KEY:
a. Coal
b. Hydrocarbons
c. Imported electric power
d. Nuclear power
e. Hydraulic power
f. Coal or nuclear

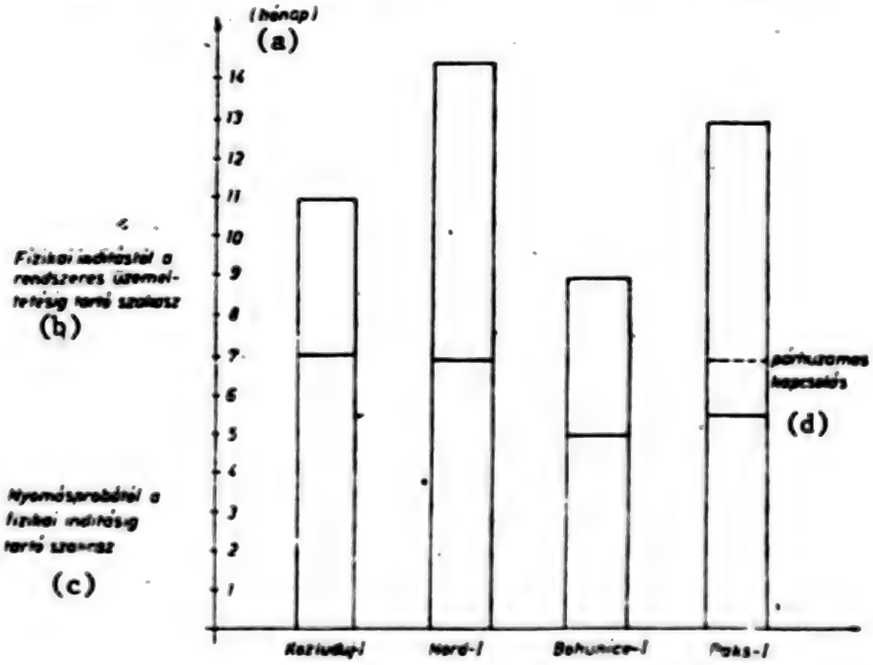


Figure 2. Commissioning periods of the nuclear powerplants operated with VVER-440 reactors

KEY:
a. Month
b. Period from physical startup (criticality tests) to normal operation
c. Period from the pressure tests to physical startup
d. Parallel connection

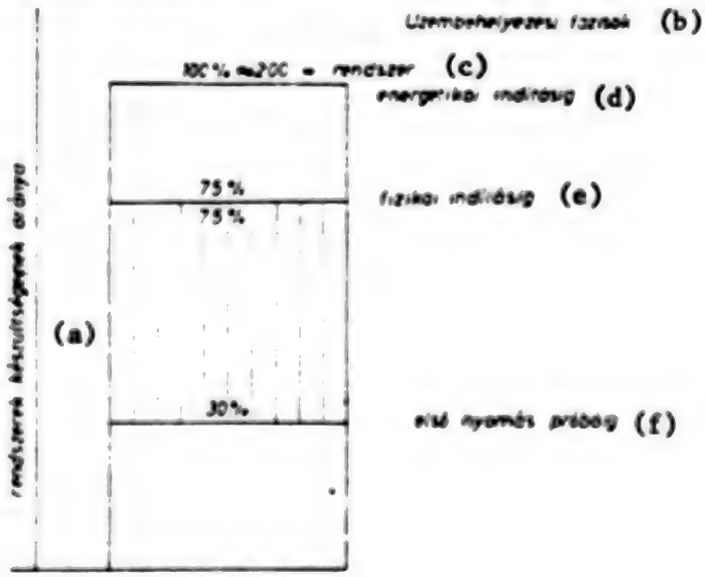


Figure 3. Requirement of startup, from the readings of the main system up to the most important phases of the commissioning procedure

KEY: a. Readiness ratio of the systems
b. Commissioning phases
c. System
d. Until ascension to power
e. Until physical start Up (criticality test)
f. Until the first pressure test

Table 1. Some of the Characteristics of the Specifically Qualified Staff Members of the Paks Atomic Powerplant

Approved total strength for the 1,760-MW level	1,609 persons	(100%)
Received specialized training abroad	793 "	(49.59%)
Received specialized domestic training in nuclear power generation within the enterprise	750 "	(46.6%)
Received specialized domestic training in nuclear power generation outside the enterprise (universities, institutes)	360 "	(23.3%)
Period of specialized training per person		1.3 months

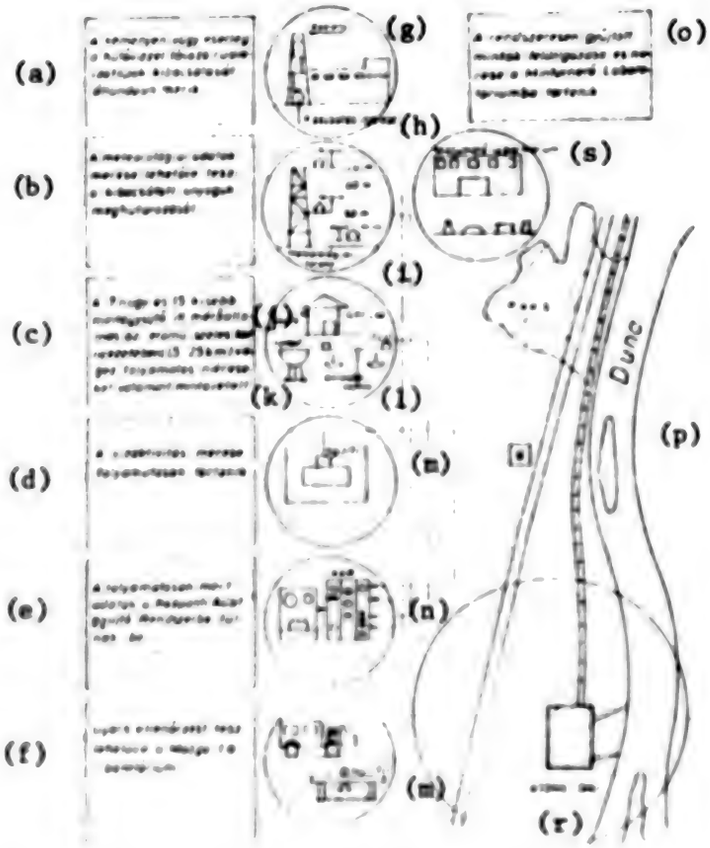


Figure 4. The environmental radiation safety control system of the Paks Atomic Powerplant

KEY:
a. The radioactive isotopes released through the stack or with the coolant, are continuously checked.
b. The survey of the meteorological data makes it possible to determine the released materials.
c. The 7 large and 15 smaller sampling or survey stations carry out continuous measurements and sampling operations in the broad vicinity (15-25 km) of the powerplant.
d. The activity of the water is determined continuously.
e. The continuously determined data are collected in the central Data Collection system.
f. The mobile laboratory makes rapid control possible.
g. Stack
h. Measurement of the release
i. Meteorological tower
j. GM counter
k. Fallout
l. Aerosol
m. NaI/Tl
n. Central Data Collection System
o. The systematically collected samples are processed and measured at the sample measuring laboratory.
p. Danube River
r. Nuclear powerplant
s. Sample measuring laboratory.

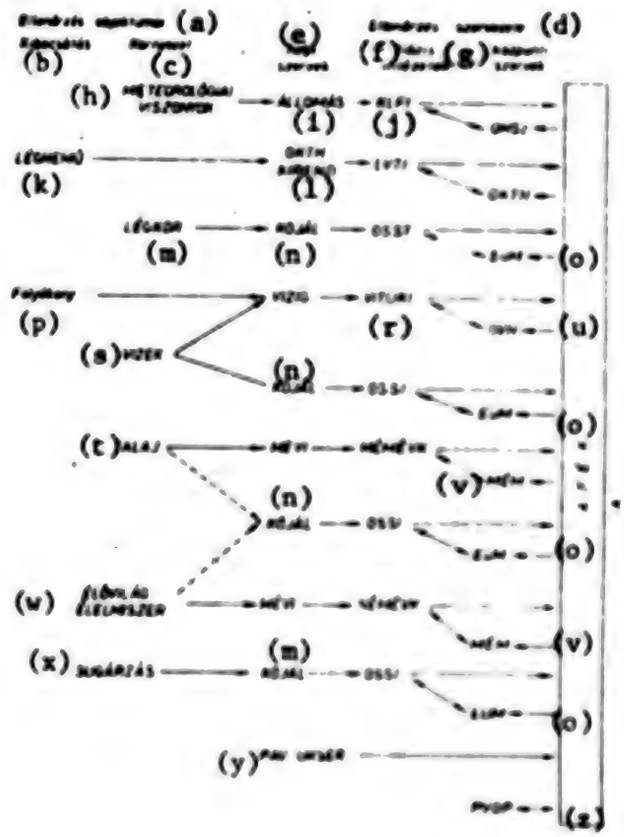
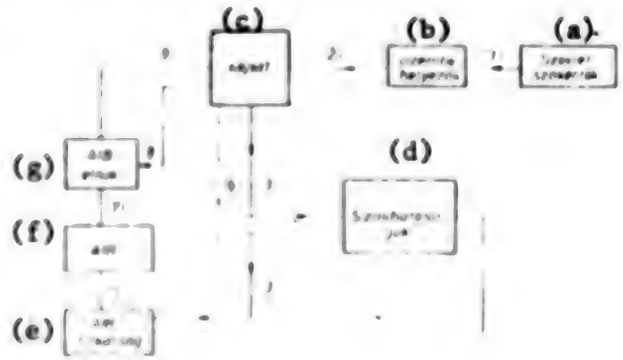


Figure 5. Organization of the official environmental radiation-protection system and its relationship with the data processing and evaluating center

KEY:
a. Subjects of the control
b. Release
c. Environment
d. Organization of the control
e. Local organs
f. Basic institutes
g. Control organs
h. Meteorological conditions
i. Station
j. Control Institute of Atmospheric Physics
k. Gaseous
l. Branch of the National Bureau for the Protection of the Environment and Nature
m. Atmosphere
n. Public Health and Medical Clinic for Contagious Diseases
o. Ministry of Health
p. Liquid
r. Scientific Research Institute on Water Resources
s. Waters
t. Ground
u. National Water Bureau
v. Ministry of Agriculture and Food Industry
w. Biosphere, food
x. Radiation
y. Environmental radiation safety protection system of the Paks Atomic Powerplant
z. National Civil Defense Command



Processes:
1. 2. Reporting the completion of conditions
3. Document requesting the license; certification that the conditions have been fulfilled
4. Position of the specialized official agencies
5. Proposed license for the State Startup Committee
6. Eventual additional requirements
7. Decision of the State Startup Committee

8. Report of readiness before startup
9. Issuance of the license by the State Startup Committee

Figure 6. The startup licensing process (State Startup and Acceptance Control Committee--issuance of the license by the State Startup Committee)

KEY: a. Soviet experts
b. Operation startup staff
c. Hungarian Electric Works Trust
d. Specialized official agencies
e. Secretariat of the State Startup Committee
f. State Startup Committee
g. Chairman of the State Startup Committee

CSO: 5100/3031
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PRINCIPLES OF QUALITY CONTROL AT THE NUCLEAR POWERPLANT BUILT IN HUNGARY

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian No 12 1981 pp 539-543

[Article by Pal Nyerges and Zoltan Szonyi (degreed engineers, State Supervisory Agency for Power Generation and Safety Technology)]

[Text]

INTRODUCTION

The first and second extension units of the Paks Atomic Powerplant are being built on the basis of Soviet plans with Soviet assistance. Hungary participates significantly in the execution; therefore the installation is not built as a turnkey plant.

1. MAIN FEATURES OF THE PAKS ATOMIC POWERPLANT

The nuclear powerplant will have a Soviet-built VVER-440-type reactor and its main components, which met expectations in socialist countries. It is built on the basis of a Hungarian-Soviet interstate agreement.

The actual execution of the Paks Atomic Powerplant is somewhat different than previous construction. According to the Soviet safety principles for this type, should the maximum credible accident--i.e., breakage of the largest diameter primary piping (500 diameter)--occur, a tightly closed, shielded safety building that replaces the containment and resists internal overpressure, prevents the release of radioactive products into the environment. If pipe breakage is assumed, the escaping primary coolant will condense on the so-called localization tower, in contact with the inner space of the safety shield building, separated from the external environment or, more precisely, on its bubble plates.

The main components of the nuclear powerplant are supplied by the Soviet Union and individual socialist countries, while a large portion of the auxiliary system is prepared by domestic enterprises. Hungarian companies are also responsible for construction, assembly and commissioning activities. Certain special-purpose installations are supplied by capitalist firms.

The technical plan of the nuclear powerplant has been prepared on the basis of Hungarian-Soviet interstate contract concluded in 1966. A 1975 supplementary agreement serves as the basis of the construction of the most important part of the building.

The reactor vessel of the first unit, manufactured by the Czechoslovak Skoda Works, was installed in 1980. The technical-installation and functional testing of the individual system is on course. The startup of operations of the first unit is scheduled for the second half of 1981.

2. MOST IMPORTANT AGENCIES INVOLVED IN THE EXECUTION OF THE NUCLEAR POWERPLANT

In Hungary, the Ministry of Industry is in overall charge of powerplants, while the Hungarian Electric Works Trust supervises them directly. Within this agency's sphere of activity is the establishment of powerplants, responsibility for which has been assigned to its subsidiary, the Electric Powerplant Investment Enterprise.

The Enterprise for the Design of Electric Powerplants and Networks adapts to Hungarian conditions the plants developed by the Soviet design contractor, Teploelektroproyekt (TEP), and also carries out independent design activity, covering architectural and mechanical engineering installations contracted by Hungary. TEP carries out its general contractor responsibilities through the intermediary of Atomenergoexport (AEE), which handles Soviet exporting activities. Before technical erection started, the Hungarian Electric Works Trust established the Paks Atomic Powerplant Enterprise (PAPPE). The coordinated planning, execution, supply and assembly activities are carried out by 110 enterprises under the supervision of the Electric Powerplant Investment Enterprise. The relationship between the major agencies is illustrated in figure 1.

3. LEGAL AND TECHNICAL BASES OF QUALITY ASSURANCE

The safety regulations specified in the legal decrees of the atomic law (1) and of the responsible ministries and major agencies--defining the specific situation prevailing within the country--are applicable for the establishment of nuclear powerplants in Hungary. As far as establishment, these requirements agree well with the specifications in force in the Soviet Union and those prescribed by various international agencies (IAEA, ICRR, CEMA, ISO).

The atomic law assigned to the Ministry of Industry the technical regulations for the safety of nuclear powerplants. The jurisdiction for regulation by the Ministry of Industry includes the publication of technical safety requirements and specifications related to the establishment, startup, operation and decommissioning and the issuance of establishing, operating, modifying and decommissioning licenses and official inspections and tests.

According to the law concerning the state administrative Hungarian codes (2), this activity is carried out by the division of nuclear safety of the State

Supervisory Agency for Power Generation and Safety Technology (abbreviated as State Supervisory Agency) as the first-level safety engineering agency.

Following the decree of the Minister of Industry (3), the safety regulations and guidelines are prepared under the supervision of the State Supervisory Agency with the help of a broad range of studies by committees of technical experts, taking advantage of the most up-to-date literature, data and foreign experiences.

--The technical safety regulations of nuclear powerplants (4) contain the licensing procedure for the whole establishment and its main components, stating the fundamental design criteria, the basic licensing document prior to the establishment and operation, and the required content of safety reports.

--The quality assurance regulation of the establishment of nuclear powerplants (5) prescribes the fundamental quality assurance requirements for the planning, manufacturing, assembly, startup and operational periods.

In addition to these regulations, additional regulations and guidelines contain specifications concerning the most important areas of nuclear safety technology (pressure vessels, welding and control of welding) (5,6,7,8).

4. FUNDAMENTAL QUALITY ASSURANCE CHARACTERISTICS OF NUCLEAR POWERPLANTS IN HUNGARY

According to the basic principles of the quality assurance concerning the safety of nuclear powerplants:

--an overall program must be developed and executed, covering the whole establishment and all of its vital components; and

--a separate program must be developed and executed for each of the partial activities for the periods of design, fabrication, assembly, startup and operation.

These principles are generally applicable for all countries that establish a nuclear powerplant but they are executed differently, depending on the following factors:

--the level of the industrial development of the country in question;
--its industrial traditions and experiences;
--the level of the nuclear, legal and regulatory system; and
--the political and economic position of the country in question with respect to the supplier.

In the quality assurance practice of Hungarian nuclear powerplant construction, the following economic characteristics apply.

--Our country is an intermediately developed, small country; it cannot expect to become completely independent in the design and fabrication of nuclear powerplants.

--Hungary has considerable experience in the manufacture of certain conventional powerplant equipment and instrumentation, which resemble the technology of nuclear powerplant components, such as secondary-circuit systems, vessels, electrical devices, lifting and transporting machines.

--The country possesses an extensive system of basic and applied research and development institutes and an outstanding hinterland of education and training.

--Hungary established a practice of broad collaboration with both socialist and capitalist, developed and developing countries.

The organization, coordination and control of the quality assurance activity is divided between the Electric Powerplant Investment Enterprise and the State Supervisory Agency.

5. QUALITY ASSURANCE DURING THE PLANNING STAGE OF THE NUCLEAR POWERPLANT

The technical design of the Paks Atomic Powerplant and the safety report, developed at the same time, were adapted by the Enterprise for the Design of Electric Powerplants and Networks. Later, the Hungarian authorities checked and approved them. The specific, official Hungarian specifications, which contain the quality assurance requirements for that period, were effective while the overall design was prepared.

Even though the Soviet partner did not prepare an all-encompassing quality assurance plan for the inclusion in the general plan of the nuclear powerplant, both the nuclear steam-generating system and its Soviet-designed main components (reactor, steam generator) have been actually built in several countries (Soviet Union, German Democratic Republic, Bulgaria, Czechoslovakia, Finland) and are operating safely and reliably. Therefore the Hungarian side accepted the experience of the Soviet designers of the project as guarantee.

The quality of the plans are guaranteed by the dual general design. The Soviet plans are checked according to Soviet regulations by the internal control organs of TEP and the involved Soviet agencies and institutes. The adapted general design and the Hungarian schemes are checked for quality assurance by independent departments of the Enterprise for the Design of Electric Powerplants and Networks.

Control of the planning work is based on the mentioned regulations and guidelines and the supplementary specific design specifications approved by the State Supervisory Agency. The schematic diagram of the checkup of the design is illustrated in figure 2.

Assembly work on the premises is permitted only as indicated in work plans (welding, welding inspection), checked and approved by the State Supervisory Agency. Documentation of the various activities is a very important part of the quality assurance system. Identification and conciseness are based on a well-developed identification system that the designers, vendors,

fabricators and assemblers have been using consistently since the start of the general design in every phase of the execution.

Installations and structural elements--both manufactured within the country and imported--that are subject to official licensing must have an operating manual, which must contain the most important technical features of the installation. The State Supervisory Agency issues an installation license only for devices or pipeline systems that satisfy the requirements of the safety report attached to the technical design and the manufacturing permits.

The operating manual of the nuclear pressure vessels serves also as a CEMA standard (10) and as a model for the piping manual for primary and secondary liquid systems. The latter includes the manuals and other technical documentation of all components within the system.

The installations are fabricated, assembled and started up as agreed in the Hungarian-Soviet supply-and-power startup contract. The Soviet-guaranteed conditions and the documentation requirements of the Hungarian authorities must be fulfilled. The documentation contains the certificates to be transmitted to the operator (Paks Atomic Powerplant Enterprise) and the materials in the registry, which remain in the possession of the contractors. The State Supervisory Agency, in cooperation with the pertinent technical committee responsible for the transfer and acceptance, carefully checks out the documentation.

6. QUALITY ASSURANCE DURING THE PHASE OF MANUFACTURING AND ASSEMBLY

Precisely because of the multilateral cooperation, it is difficult to achieve a uniformity in the quality assurance as far as the fabrication of nuclear powerplant components are concerned. When components to be imported are ordered, the Electrical Powerplant Investment Enterprise specifies in the contract the required quality assurance and documentation and prepares an acceptance, control and inspection plan for them. In the case of components manufactured in the Soviet Union, or supplied by the Soviet Union and fabricated in a third country, the Atomenergoexport specifies the Soviet state standards, which the Soviet authorities have established in their regulations.

As far as quality assurance, in the Hungarian-Soviet supply contract it has been agreed that an independent Soviet state supervisory agency, KPT, will check and supervise the testing and inspection at the fabricator's plant, as part of the customary inspection during and at the end of the manufacture. The State Supervisory Agency accepts KPI certifications in the documents and manuals accompanying the transported components, if they satisfy both the Soviet and the Hungarian safety requirements.

In some cases, the Electric Powerplant Investment Enterprise and the State Supervisory Agency participate in especially important quality tests during fabrication or at the final stage of certain components (for example, the pressure testing of the reactor vessels at the manufacturing plant). In the

case of products supplied by the Soviets but imported from capitalist countries (for example, specialized armatures), the Soviet technical specifications must be fulfilled. Such products are tested and inspected, on the one hand, during or at the end of the fabrication and, on the other hand, at the time of the official safety test and functional checkup of the system. The State Supervisory Agency functions during the manufacturing and assembly period in the following manner.

--It checks the manufacturing and assembling documentation and carries out the structural inspections and pressure tests. If it finds everything adequate, it attaches an appendix to the manuals.

--It participates in the various functional tests of the primary and secondary circuit systems. Together with the technical committee responsible for the acceptance, without curtailing the warranty conditions assumed by the Soviet party, it certifies successful functional testing.

--It ascertains the suitability of fabrication and assembly by checking the qualification of the supplier, which at the same time facilitates or renders unnecessary offical inspection during fabrication or assembly.

Of these mentioned activities, qualification presents special interest (fig. 3). In order to issue a qualification certificate--which applies for a specific product and a specific time period--the enterprise in question must attach a certifying documentation to its application. The State Supervisory Agency creates a qualifying committee, including experts from the enterprises and specialized institutes, to study the contents in the application document. The qualifying committee, which also includes a representative of the State Supervisory Agency, evaluates the documentation, inspects the premises and then submits a proposal for qualification. On the basis of this proposal, the State Supervisory Agency makes a qualification decision. Having this qualification document in its possession, the domestic enterprise concludes a contract with the Electric Powerplant Investment Enterprise after a quality assurance plan concerning the product has been developed.

During the fabrication and assembling processes, which may include both officially controlled activities and those outside the scope of control cases requiring extraordinary decisions in order to assure the quality may be encountered. For this reason, the Quality Assurance Council (QAC) was created with the participation of the Paks Atomic Powerplant Enterprise, the Electric Power Investment Enterprise, the Enterprise for the Design of Electric Powerplants and Networks, and the State Supervisory Agency. This council is an important executive agency to ensure an acceptable quality.

Its tasks are:
--approval and inspection of fabrication and assembling techniques in areas not requiring official licensing;
--licensing of modifications;
--evaluation of techniques used by unqualified enterprises; and
--guidance and advice in special cases.

The role of the State Supervisory Agency in the field of activity of the Quality Assurance Council is primarily of an advisory nature. In areas requiring official licensing, the QAC has no right to issue a decision or a verdict.

7. QUALITY ASSURANCE DURING STARTUP

According to the Hungarian-Soviet startup contract, the nuclear powerplant will be started up by Hungarian technicians under the guidance of Soviet experts. The requirements indicated in the quality assurance plans must be gradually fulfilled during every stage of the startup operation; this is checked continuously by the authorities. The Atomenergoexport prepares the technical documentation for startup for the systems covered by the contract.

The technical startup documentation is verified by the Atomenergoexport, the Electric Powerplant Investment Enterprise, and the Paks Atomic Powerplant Enterprise. After that, it is transmitted to the State Supervisory Agency.

Under the following conditions the State Supervisory Agency issues a license to carry out the functional test for the individual technological systems, confirming that:
--the individual safety tests (structural inspection, pressure tests) of the pressurized system have been successfully completed;
--the State Supervisory Agency qualified all necessary documentation as acceptable and appended a suitable statement to the manuals;
--the partial functional tests of the individual technological systems, as indicated in the startup technical documentation and execution work program, have been successfully concluded; and
--the State Supervisory Agency participates in the functional testing of all systems and it certifies in the minutes their successful completion, in cooperation with the technical committee involved in the startup operation.

In Hungary, in addition to the safety authority, several agencies (for example, health, environmental protection, hydrological, internal affairs) participate in the licensing process of the startup operation of nuclear powerplants, proposing a variety of requirements within their own sphere of competence. They are coordinated by the National Atomic Energy Committee, which also controls the registry of the nuclear fuel material and represents the viewpoint of the International Atomic Energy Agency.

In the sense indicated in the atomic law, a State Startup Committee has been established under the participation of the involved ministries and major agencies. It issues power ascension licenses for the four main phases of the startup operations:
1. the first pressure test of the primary circuit;
2. physical startup (criticality tests);
3. the ascension power startup; and
4. continuous operation.

The regulations imply that the State Startup Committee will issue licenses for initiating these successive phases only if, in addition to the

concurring approval of each involved official agency, all of the safety and qualification conditions have been fulfilled, as certified by the State Supervisory Agency.

After the successful completion of this multistage process, a license for continuous operation is issued. The qualifying documentation must include the following:
--certification of the completion of the inspections and activities specified in the quality assurance plans;
--evaluation of the results of the performed tasks and control operations to establish that complex safety conditions prevail; and
--zero-level measurement data and their evaluation.

Collection, classification and storage of the quality assurance documents approved by the authorities during the construction period is the duty of the Electric Powerplant Investment Enterprise and of the individual companies involved in the installation. These documents, organized according to the individual phases of the startup operation, are sent by the Electric powerplant Investment Enterprise for incorporation into the pertinent chapters of the safety report for the period prior to power operation to the Hungarian Electric Works trust for final checkup and approval. The latter transmits it to the operator (Paks Atomic Powerplant Enterprise) at the start of the continuous operation.

SUMMARY

The first nuclear powerplant under construction in Hungary incorporates the well-known VVER-'40-type Soviet reactor and its main components. The nuclear powerplant is being built on the basis of a Hungarian-Soviet intergovernmental contract according to a Soviet design, with the help of Soviet experts. The main components are supplied by the Soviet Union. A large part of the auxiliary installations is fabricated by Hungarian plants; Hungarian enterprises are also carrying out the installation and startup operations. We have purchased many components from Western companies. Thus the supply represents a multilateral cooperation.

The quality assurance of the components and systems of the nuclear powerplant during the various phases of the construction was achieved in the following manner:

--Design. The design prepared by the Soviet general contractor (Teploenergoproekt) was adapted by the Enterprise for the Design of Electric Powerplants and Networks).

--Fabrication and assembly. The quality of components obtained from socialist countries during fabrication is controlled by the quality assurance agency of the supplying country, under the supervision of the Soviet control agency (KPI).

The quality of items from Western countries is guaranteed by the pertinent agency of the country in question, recognized by the National Energy

Management Authority. Similar strict quality assurance principles apply to domestically manufactured products. Fabrication of components or systems for nuclear powerplants or pertinent assembly operations are exclusively restricted to organizations qualified for such work. These qualifications are issued by the State Supervisory Agency. The assembly is managed and inspected by expert Soviet and Hungarian organizations. Both the specifications of the Hungarian-Soviet contract and the requirements of the Hungarian regulations must be satisfied in the course of manufacture and assembly.

--Startup and operation. The requirements contained in the quality assurance plans must be gradually fulfilled both until fuel-loading and during the phases controlled by the startup agencies. Approval for the main phases of startup is issued by the State Startup Committee. The documents of the realized quality assurance plans, which have been transmitted both to the officials and to the State Startup Committee, must be verified to ensure that they indeed satisfy the previously set conditions. These documents also represent a part of the final safety report.

1. ábra. A Paksi Atomerőmű létesítésének engedélyezésében részt vett hatósági intézmények

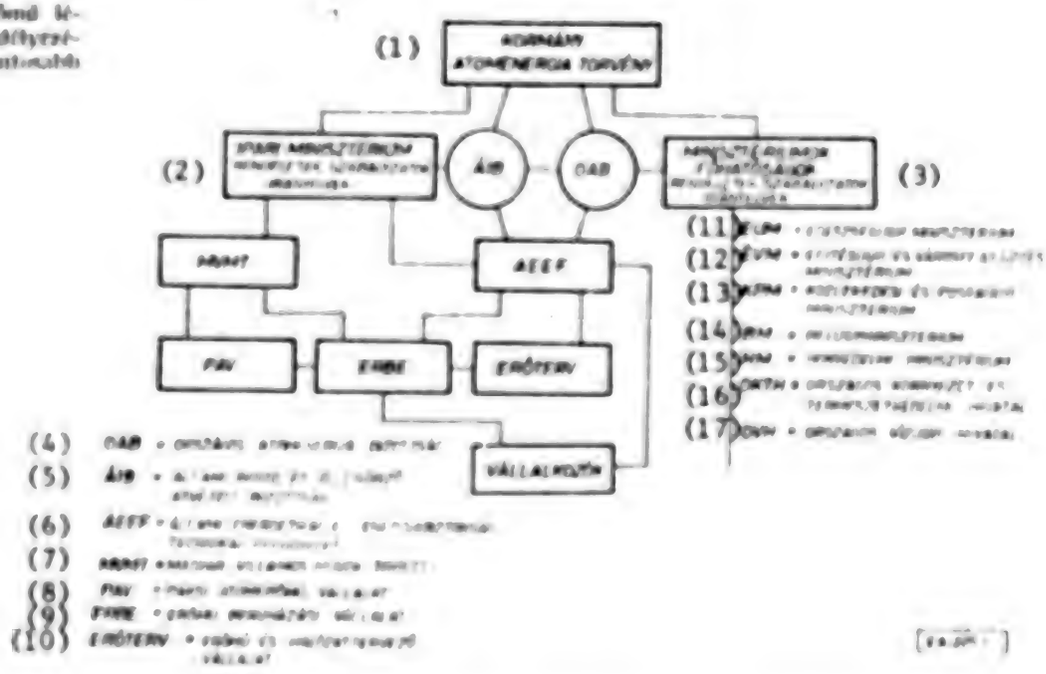
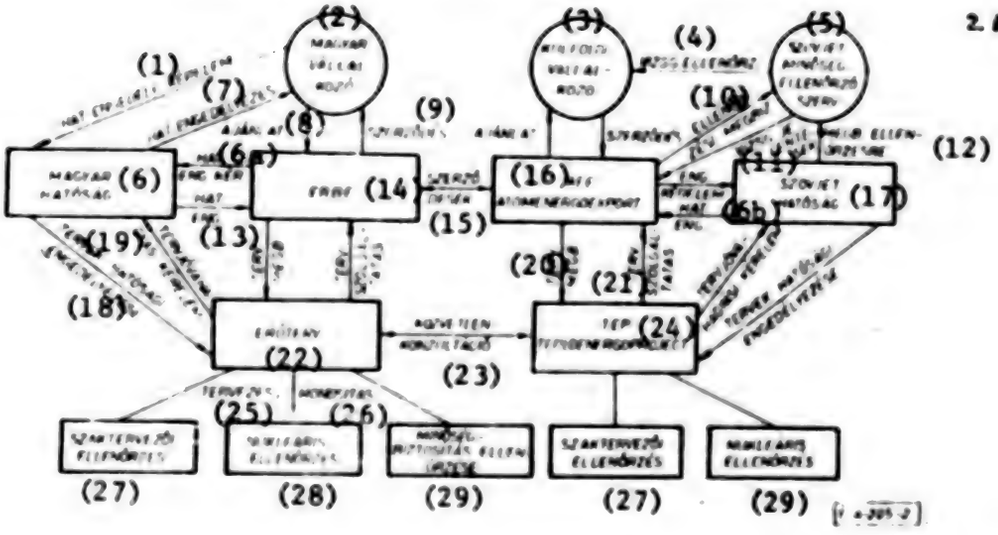


Figure 1. Some of the important organizations involved in licensing the establishment of the Paks Atomic Powerplant

KEY:
1. Government; Atomic Energy Law
2. Ministry of Industry; rules, regulations, guidelines
3. Ministries, major agencies; rules, regulations, guidelines
4. OAB--National Atomic Energy Committee
5. AIB--State Startup and Acceptance Control Committee
6. AEEF--State Supervisory Agency for Power Generation and Safety Technology
7. MVMT--Hungarian Electric Works Trust

8. PAV--Paks Atomic Powerplant
9. ERBE--Electric Powerplant Investment Enterprise
10. EROTERV--Enterprise for the Design of Electric Powerplants and Networks
11. EUM--Ministry of Health
12. EVM--Ministry of Construction and Urban Development
13. KPM--Ministry of Transportation and Postal Affairs
14. BM--Ministry of the Interior
15. HM--Ministry of Defense
16. OKTH--National Bureau for the Protection of the Environment and Nature
17. OVH--National Bureau of Water Conservation

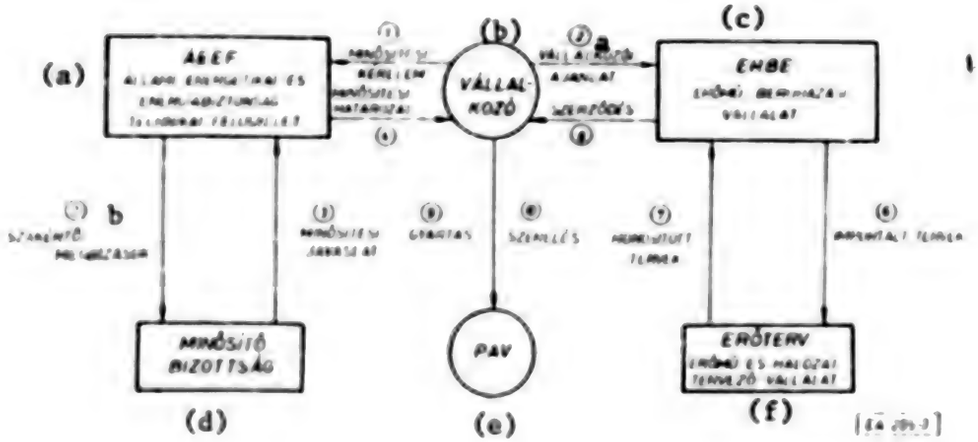


2. ábra. A Paksi Atomerőmű tervezésének ellenőrzési sémája

Figure 2. Schematic diagram showing the control steps in the design of the Paks Atomic Powerplant

KEY:
1. Application for official permit
2. Hungarian contractor
3. Foreign contractor
4. Control inspection
5. Soviet quality control agency
6. Hungarian agency
6a. Official request for license
6b. Request for license
7. Official license
8. Proposal
9. Contract
10. Control assignment
11. Inspection reports
12. Control authority
13. Official permit

14. Electric Powerplant Investment Enterprise
15. Contracts
16. State Power Generation (Atomenergoexport)
17. Soviet agency
18. Official approval of the design
19. Request for the approval of the design
20. Commissioning of design
21. Furnishing of design
22. Enterprise for the Design of Electric Powerplants and Networks
23. Direct consultation
24. Teploenergoproyect (TEP)
25. Design
26. Adaptation
27. Control by expert designers
28. Nuclear control
29. Quality assurance control



3. ábra. A gyártó és szerelő vállalatok minősítésének sémája

Figure 3. Schematic diagram for the qualification of fabricating and installing enterprises

KEY:
a. State Supervisory Agency for Power Generation and Safety Technology
b. Contractor
c. Electric Powerplant Investment Enterprise
d. Qualifying Committee
e. Paks Atomic Powerplant
f. Enterprise for the Design of Electric Powerplants and Networks

1. Request for qualification
2a. Proposal by the contractor
3. Qualification proposal
4. Qualification decision
6. Imported designs
7. Adapted designs
8. Contract
9. Fabrication
10. Assembly
2b. Expert assignments

2210
CSO: 5100/3031

CNEA CHAIRMAN ON NUCLEAR SELF-SUFFICIENCY

PY020040 Buenos Aires TELAM in Spanish 2245 GMT 30 Aug 82

[Text] Mendoza, 30 Aug (TELAM)--Vice Adm Carlos Castro Madero, chairman of the National Atomic Energy Commission [CNEA], has stated that Argentina will be self-sufficinet in nuclear matters by the year 2000.

He said that the country will be able to build its own nuclear plants, to supply them and also to be in a position of cooperating with Latin American countries in this field.

Regarding research and mutual aid in the nuclear energy sector which Argentina is carrying out, he stated that Argentina maintains close contact with all Latin American countries. It is obvious, he stated, that the most important cooperation is being carried out with Peru, with which Argentina is building a nuclear center which is in an advanced state of construction, and which is expected to be finished by the end of next year.

Castro Madero arrived in this capital this afternoon by air and was welcomed at Plumerillo Airport by Social Welfare Minister Horacio Arnut, officials of the local CNEA delegation and of the Mendoza nuclear delegation, and other officials.

At the airport VIP lounge the CNEA chairman referred to relations and the work of the Argentine nuclear organization with other countries. He stated that the Embalse Nuclear Plant is being built jointly with Canada, and that fortunately, despite the conflict over the Malvinas, there has been no interference. He expressed confidence that this plant will be put into operation by the end of this year or the beginning of next.

Castro Madero admitted that the CNEA's current budget situation is very difficult due to the situation which is known to everyone. He added, however, that this will not force Argentina to give up its plan on nuclear energy matters, because we will be able to reach a balance concerning reducing the rate of progress of the nuclear plan, without affecting appreciably the Argentine position or its progress in this regard.

Regarding the so-called nuclear waste, Castro Madero stated that the country must plan ahead about what to do with the final products of the nuclear fuel

cycle since it has already made the decision to reprocess them so as to increase its uranium resources.

He stated in this regard that the product of the processing plant is what worries the whole world, but we have not arrived at the situation which at this moment worries the most developed countries. That is to say, to have storage facilities ready.

In this regard he explained that a series of studies has been initiated with the cooperation of San Juan University and that 200 suitable places have been spotted. He added that they chose a place located in Sierra Del Medio, Chubut Province, where studies are being carried out to find out whether facilities can be installed there.

Asked about the military use of nuclear energy, Castro Madero reiterated that Argentina's unchanged position has been to use nuclear energy with exclusive purposes [as received].

He explained that the controversial point is whether or not the use of nuclear energy in a submarine is a peaceful use. This issue has been clearly proposed to the CNEA [as received]; it has been requested that the topic be included in the agenda of the meeting to be held in Vienna in September 1982.

Finally, concerning the Sierra Pintada deposits in San Rafael department in southern Mendoza, he said that it has been advised that the call for bids for the exploitation of the deposit be delayed until the end of the year.

Castro Madero then presided over the celebration of the fifth anniversary of the Mendoza nuclear project. He is due to return to Buenos Aires tomorrow night after a visit to southern Mendoza.

CSO: 5100/2250

EMFA CHIEF SAYS BOMB IMPORTANT IF PROBABLE ENEMY HAS IT

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Aug 82 p 6

[Text] Rio--Chief of the Armed Forces General Staff [EMFA) Gen Alacyr Frederico Werner said in Rio yesterday that despite the need to reequip the armed forces, the distribution of budget funds to the sectors that make development possible will continue to be the priority. "Since there is no foreseeable threat in the short term," said the general, "I believe that we can continue to run that calculated risk."

Alacyr Frederico Werner, who explained the general guidelines of the Armed Forces Genreal Staff policy to the students of the War College (ESG), said that Brazil maintains unchanged its "peaceful position" of not producing an atomic bomb. "The Brazilian Armed Forces," he explained, "consider it very important to have an atomic bomb if a possible or probable enemy has it. But until that occurs, we will pursue our peaceful option on the use of nuclear energy."

Werner related that in his talk, he sought to show the need for integration among the land, sea and air forces, "based on the lessons of modern wars, particularly since World War II. There is no longer any armed conflict that can be won with a single, isolated force. It has to work together with the others in the battlefield. More than that, that preparation must be made beginning in peace time. That perhaps is the principal mission of the EMFA, which is to stimulate the mutual cooperation, work, training and drilling of the armed forces."

In the opinion of General Werner, the Falklnads war is a good example of the need for integration among the three forces, and the impossibility of Argentina to achieve that objective ended up leading it rapidly to a critical situation in the defense of the islands. "That stemmed obviously from the distance of the Malvinas from Argentine continental territory. The ground and air forces were in the islands but the naval forces were unable to participate because of the technological superiority of the adversary. The air force also had very few opportunities to support the ground force because the range of the planes prevented that aid," he declared.

Development and Security

The minister-chief of the EMFA admitted that there is a great desire to reequip the Brazilian Armed Forces. "But the problem is that we would be reducing the investments in development, that is, in sectors that would make it possible to raise or, at least, to maintain the national living standard. Since there is not a foreseeable threat in the short term, I believe we can continue to run this calculated risk. So we will be buying only 2 submarines instead of 100."

Alacyr Frederico Werner admitted that the situation of Brazil is cause for concern "and it would be foolish to say that the serious situation the world is going through does not affect Brazil is such a way as to concern us.

"Today, I had the occasion to tell the students of the ESG that last year Brazil spent $10 billion buying oil. If the oil prices were the same as they were at the beginning of 1973, Brazil could satisfy its oil needs for less than $1 billion. Then we would have the possibility of having $9 billion available today. That would be enough to pay off Brazil's current foreign debt in 5 years, or would be enough to purchase 36 frigates, or more than 100 submarines. Unfortunately, we will have to content ourselves with only two more submarines now," he declared.

Atomic Bomb

The chief of the EMFA stressed that, in accordance with its peaceful policy, Brazil opted for the use of nuclear energy for nonmilitary purposes. "Therefore, there is no project at the government level for the use of nuclear energy for military purposes. The only military purpose for which we can and should use nuclear energy will be, unquestionably, the propulsion of our ships, particularly our warships. Naturally, that is not for the near future. We will only attain that technology further down the line."

8711
CSO: 5100/2238

CALS REFUTES CNEN REPORT ON FURTHER ANGRA-I DELAY

Sao Paulo FOLHA DE SAO PAULO in Portuguese 6 Aug 82 p 17

[Text] Santa Barbara--Mines and Energy Cesar Cals announced yesterday that Westinghouse technicians will be in Brazil by the end of September to change the steam-cooling system equipment of the Angra-I nuclear plant, asserting also that the plant will begin to operate at full capacity at the beginning of 1983. The National Nuclear Energy Commission (CNEN) had announced 3 days ago that Angra-I would be further delayed in view of the problems that had emerged and that full load operation would not be possible at the beginning of next year.

The changes to be made by the Westinghouse technicians are necessary to avoid the further leakage of steam as occurred in the plants produced by the same company in Sweden, Spain and even in Angra-I, which even caused cracks in some piping.

According to Cesar Cals, Westinghouse desinged and tested the new equipment on a reduced scale. "Now it will begin to test it on a one-to-one scale and it will make the change here in Brazil only with safety," the minister said, but he could not say if the Brazilian plant will be the last to be repaired after the changes in the units in Sweden and Spain.

Cals asserted also that Brazil is not thinking of suing the American company for the losses caused by the problems in the steam generator. "What we want is for the plant to go into operation. What might be fitting would be to ask for indemnification for lost revenue but that is not the case since we do not need to use the energy from Angra," he said.

In the opinion of the mines and energy minister, the fact that Angra-I has not gone into full-capacity operation is not causing losses to Furnas because the company does not need the energy. He explained that Brazil "does not have a pressing need for electric energy based on nuclear power inasmuch as consumption in the Southeast market is low."

8711
CSO: 5100/2238

NUCLEBRAS DENIES RESENDE TO BE SITE OF REPROCESSING PLANT

Rio De Janeiro O GLOBO in Portuguese 30 Jul 82 p 11

[Text] O GLOBO has received the following letter from the president of the Brazilian Nuclear Corporation (NUCLEBRAS), Ambassador Paulo Nogueira:

"In a report published in the edition of the day before yesterday, 27 July, under the title: "Committee Wants To Ban Nuclear Plants in the Paraiba Valley," O GLOBO reports that the Executive Committee for Integrated Studies of the Hydrographic Basin of the Southern Paraiba River (CEEIVAP) is studying the establishment of restrictions on the installation of nuclear plants and nuclear fuel reprocessing plants in that hydrographic basin to preserve the quality of the water.

"The same report adds, as information from the newspaper, that 3 years ago NUCLEBRAS began the construction of a plant for reprocessing the uranium of the Angra dos Reis plant, on the bank of the Funil Dam in Itatiaia in the municipality of Resende. It says also that the dangers which this project represents to the principal source of drinking water of Greater Rio will be discussed during the Declaration of the Rights of the Paraiba River seminar sponsored by O GLOBO and the Light Company, on 3 and 4 August, in the auditorium of the Federal Savings Bank.

"In view of the fact that this is a seminar sponsored by O GLOBO, I believe it is especially opportune to convey to my esteemed friend some corrections to the aforementioned report. At no time did NUCLEBRAS consider building a nuclear fuel reprocessing plant in Resende. There is no company document or statement of any kind by anyone in tis management that could lead O GLOBO to publish what it did. More absurd still is the statement that that plant has been under construction 'for 3 years.'

"What NUCLEBRAS is building in the Engineer Passos District--and not in the Itatiaia District, as O GLOBO reported--in Resende is an industrial complex to be comprised of a plant for the conversion of uranium dioxide into uranium hexafluoride, a uranium istopic enrichment plant and a fuel element factory, to be inaugurated within 2 months. None of them will reprocess irradiated fuel, that is, fuel already spent in a nuclear power station.

"The three NUCLEBRAS industrial units in Resende, by thier nature, will not release radioactive wastes and cannot contribute anything to cause any harm to the environment, much less the waters of the Paraiba River.

"The Fuel Element Factory (FEC) which will go into operation soon is a mechanical assembly industry which has no way of polluting the environment. Nevertheless, because it is a nuclear industry, in which the measures aimed at preserving the environment are much stricter than in any other industrial branch, it has an internal safety program for nuclear accounting, and an external one of environmental monitoring. The latter, supervised by the National Nuclear Energy Commission (CNEN) and the State Secretariat of the Environment (SEMA) makes a periodic evalution of environmental conditions and of its effects on the air, water, soil, plants, agricultural products and animal products, and places the data gathered at the disposal of both those organs as well as the general public.

"If the other industries were to adopt the same standards of preservation of the environment, the problem of pollution would not be causing so much concern today in the world.

"To have an idea of the safety of the three plants of the NUCLEBRAS industrial complex in Resende, suffice it to note these data: international regulations indicate that the acceptable limit of uranium in drinking water is 042 mg/liter. If, only for the sake of argument, we assumed the absurd possibility of NUCLEBRAS not utilizing the production of its three factories at all but, on the contrary, poured it all into the Paraiba River at one time, even so the water of the river would still be within that limit which international regulations indicate as acceptable.

"Furthermore, the safety standards of the Resende industrial complex were recognized by O GLOBO in reports on the FEC published in its editions of 31 January and 14 March of this year. In gathering data for the two reports, the newspapers reporters had full freedom of observation and no information was concealed from them. The first of these reports, moreover, emphasized the factory's environmental monitoring program, begun well before the date envisaged for its opening.

"Nevertheless, if there remains any doubt regarding the care taken at the site with reference to ecological preservation, NUCLEBRAS is ready once again to receive the reporters of O GLOBO, to show them all the installations of the industrial complex and to give them any information they desire.

"I also wish to point out the contradiction between the information in the title of the report, that the committee wants to ban nuclear plants, and that of the opening paragraph, that the aforementioned committee is studying the establishment of restrictions on the installations of nuclear plants and reprocessing plants. Even at that, the report is invalid. The proposal to which the report refers was not accepted by the committee."

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CSO: 5100/2258

CNEN LICENSES FUEL ELEMENT PLANT IN RESENDE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Aug 82 p 25

[Text] Rio--The National Nuclear Energy Commission (CNEN) yesterday approved the license for operation of the fuel element factory of the Resende nuclear complex, which will assemble the charges of Brazilian nuclear reactors up to the year 1988, when the enrichment plant should be ready, thus enabling Brazil to be self-sufficient in the nuclear supply area.

The Resende nuclear complex is comprised of the fuel element factory, the plant for the conversion of yellow-cake into uranium hexafluoride and the uranium enrichment industrial plant. The two remaining units, the conversion plant and the enrichment plant, are behind schedule as a result of the hitches faced by the jet-nozzle technological process, which was the only option for uranium enrichment under the German-Brazilian nuclear agreement.

The uranium conversion plant was purchased by NUCLEBRAS from Pechiney Ugine Khulman under the turn-key system, that is, without the transfer of technology. At the time, Brazilian scientists protested, saying that the purchase was unnecessary since the Nuclear Research Institute of Sao Paulo had successfully developed that technology. NUCLEBRAS replied that the purchase was essential to supply the fuel element factory with raw material.

Now the fuel element factory is ready to operate although the hexafluoride conversion plant is delayed, forcing NUCLEBRAS to pay France for the yellow-cake conversion service. Practically, what is ready and will begin to operate is only the terminal part of the Resende nuclear complex. The two first units that are going to produce the raw material for the third are going to be delayed in entering into operation.

In any case, NUCLEBRAS considers the inauguration of the fuel element factory very important because it will eliminate one of the phases of the burdensome process of producing nuclear fuel. The fuel element factory is of the mechanical, semiheavy, high-precision type, in which almost all phases are controlled by computers to avoid manual contact or any impurities. The very cold air conditioning maintains an internal density in the factory that isolates it from dust.

To produce the fuel element, the factory will use the uranium hexafluoride, transforming it into uranium dioxide. Then it pelletizes that uranium dioxide in the form of little rods 1 centimeter in diameter by 3 meters long in casings of "zircalloy," a metallic alloy that will be supplied by Argentina. Before being hermetically sealed, that rod receives an inert atmosphere of helim gas. About 235 little rods comprise a fuel element, which is taken into the nucleus of the reactor for the fission process.

8711
CSO: 5100/2238

BRIEFS

ANTIBOMB PROTEST IN PARANA--Curitiba--In Parana yesterday, about 50 persons participated in a march against the use of nuclear weapons promoted by the Sete Quedas Movement which 2 weeks ago organized a large demonstration in Guaira against the flooding of the Sete Quedas falls by the Itaipu Hydroelectric Plant reservoir. The march went through the main streets of the city, with the demonstrators covered by white shrouds and bands and carrying placards that warned: "Better active today than radioactive tomorrow." The leaflet distributed during the demonstration recalls the U.S. atomic bombing of Hiroshima and Nagasaki which killed more than 200,000 persons. The leaflet warns about the large arsenal maintained today by the world powers, which have weaponry sufficient to launch 15 tons of atomic dynamite [as published] to kill every inhabitant on the planet." According to the movement, Brazil is preparing to join the "atomic club" with the construction of nine nuclear plants. The document says that "4 million low-cost homes could be built with the funds used in the construction of only one plant. The march, which ended without any speeches, left only one message: "If you do not agree, discuss, make your complaints known." [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Aug 82 p 31] 8711

DELAYS IN ANGRA-I, III--Rio--Mines and Energy Minister Cesar Cals announced in Rio yesterday that the nuclear program will be delayed by the slowing down of its projects in conformity with available funds. He added that the Tucurui project (generation part) will be delayed for 1 year and that of Itaipu (transmission lines) for 6 months. The decision taken by the government was to extend the schedules for the projects in accordance with existing revenue and based on the decision that each project will only be begun or speeded up with the money guaranteed. Cesar Cals said that the possibility was opened for obtaining new funds through loans in the domestic and foreign markets by authorization of the Planning Secretariat (SEPLAN), already granted. According to the minister, with the extension of the projects in Sao Paulo will be delayed. With regard to Tucurui, he observed that the 1-year delay will exclude the guarantee of supplying energy to the Carajas project companies because the transmission line has been completed. Referring to Itaipu, he indicated that its projects may continue normally if new funds are obtained. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 10 Aug 82 p 33] 8711

CSO: 5100/2238

BRIEFS

NUCLEAR ACCIDENT REPORTS DIFFER--Duesseldorf/Karlsruhe, 27 Aug (DPA)--Conflicting accounts were given today about a mishap which occurred on 20 August at the Wuergassen nuclear power station. The North Rhine-Westphalian Labor Ministry confirmed that radioactive dust was released when a sand filter was exchanged. But the exposure of workers and the room concerned was well within the permitted radiation level. "No one suffered injury," a ministry spokesman said. However, according to the Federation of Environmental Action Groups, two workers were taken to the hospital. The staff had been asked to keep the incident secret. The 600 MW nuclear power station has been switched off since May for maintenance work. It was commissioned in 1972. [Excerpts] [LD272018 Hamburg DPA in German 1716 GMT 27 Aug 82]

CSO: 5100/2246

BRIEFS

BOMB EXPLODES AT TOULOUSE--Toulouse, Aug 19 (AFP)--A bomb exploded during the night outside the offices of a construction firm here working on the site of the Golfech nuclear power plant, causing no casualties but considerable damage. The main building caught fire, and a temporary prefabricated office unit nearby was totally destroyed. It was the second bomb attack [word indistinct] last night, within 24 hours of President Francois Mitterrand announcing new anti-terrorist measures. [Text] [NC191039 Paris AFP in English 1032 GMT 19 Aug 82]

CSO: 5100/2244

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September 21, 1982

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